PERFORMANCE DETAILS: 183 AIRCRAFT AND ENGINES

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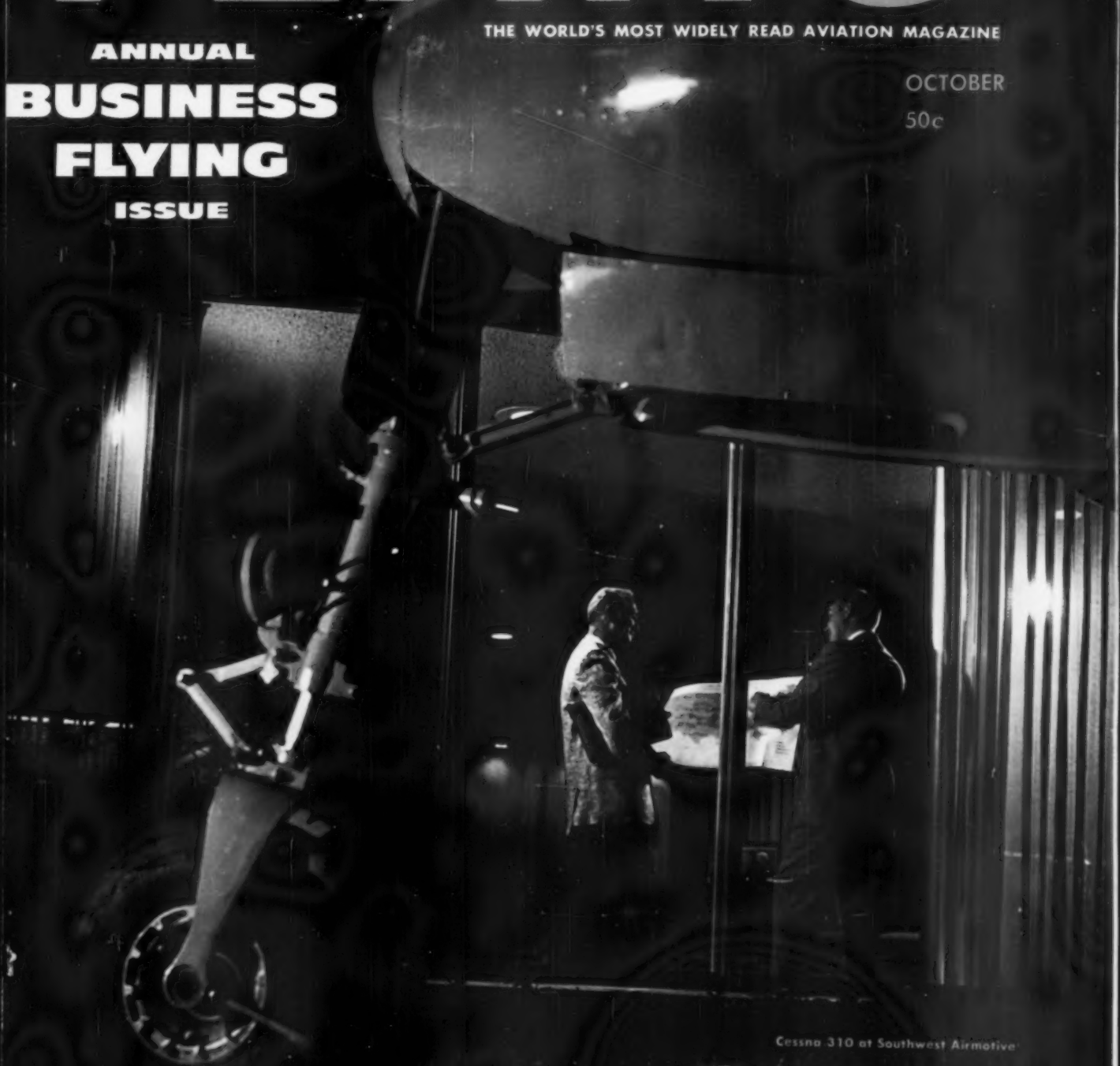
OCTOBER

50c

ANNUAL BUSINESS FLYING ISSUE



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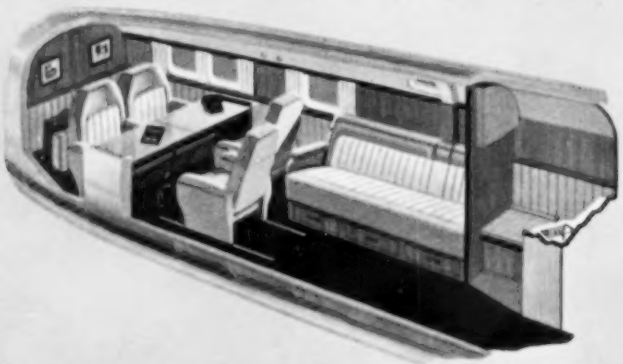

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THE COVER: The growing role of the airplane in American business is suggested by this color photo by Tony Linck—who posed a Cessna at Southwest Airmotive, in Dallas.

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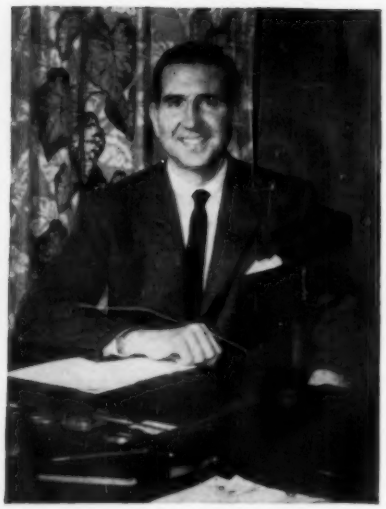

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MAILBOX

AIR SPACE COMMITMENTS

It has given me a great deal of pleasure to read your first-rate discussion of our airspace commitments and problems. ("More Space to Fly," by Kendall K. Hoyt, in the July issue of FLYING.)

This is a complex subject, and Mr. Hoyt's words have contributed measurably to the increased general understanding of its history and current status.

The author's fine comprehension of this situation makes it unnecessary for me to offer any remarks in elaboration. I would like to assure you, however, that the review of airspace allocations will be the subject of continuing concentration on the part of FAA. We feel that quick and cynical answers are neither desirable nor possible. We will not relax our efforts to adjust these commitments to whatever demands exist.

May I also point out that these adjustments would be next to impossible without the sympathetic cooperation of those for whom these assigned spaces are reserved. Our military components make up the largest in this instance, and it is a pleasure to give full credit to military and other leaders for their willing understanding of the large problems involved.

One of the major aspects of our own efforts involves the clear dissemination of information. In this . . . you have intelligently served both the flying public and this agency.

E. R. QUESADA, Administrator
Federal Aviation Agency
Washington, D. C.

INTERNATIONAL ROUTE AWARDS

. . . To whom do we look for a champion to prevent what Mr. C. C. Bradford in his article ("We're Being Invaded," August FLYING) refers to as "complete surrender in this area"? We have seen the power of constituents over their elected representatives. The New England senators got the New York/Miami route for their airline, Northeast. A reversal of the CAB finding. Who represents the voters along the international routes?

The article mentions three U. S. government bodies involved in the negotiations of each international route. There are many U.S. airlines involved, too. Each other country is represented by one government-backed airline (a real set-up for a Donnybrook).

This is especially true when the thinking of at least one of our governmental bodies is "fuzzy" at best. I once heard a list of fundamental reasons used in CAB (Civil Aeronautics Board) decisions on 26 domestic route awards. Each reason had been used both to grant the route in one case and to deny it in another. . . .

If this kind of unprincipled rationalization goes on in *one* of the agencies involved, certainly Mr. Bradford has not overstated the seriousness of our position in the international field.

What do the leaders of the airline industry have to say about this? Are they so quiet because of fear of retaliation by regulatory agencies? Or are they so unsure of themselves that they are afraid to compete over routes they enjoy through "grandfather rights"? . . . Has legislation adopted in 1938, when every airline was dependent on the government, so stagnated progress that now only the foreign carriers are in a position to develop efficient route patterns?

I suspect you'd find U.S. airline management willing to compete with anyone—*on an equal basis*. They would have confidence in their ability to succeed, based on our leadership in the management revolution created by that part of American industry which can still be called free enterprise. They would *not* propose trade barriers to prevent the free choice of Americans to buy foreign transportation, but they would insist on the equal right of American carriers to provide competitive services.

May we look for more articles about the effect of regulation on air transportation? And to whom do we look, Mr. Bradford, to start straightening out the international picture?

A. W. LEONARD
Huntington, N. Y.

SPARE TIME REPAIRS

. . . "A Plane in Every Garage" might be an appropriate title for this picture, one which I took recently and which, in my opinion, is a story in itself.

The plane is a Stinson Voyager owned by J. E. Tatem of Dallas. I happened by as Mr. Tatem was in the midst of a recovering job on its wings. His explanation for the unusual occupant of his garage was "convenience." He found it much easier to work on his airplane at home in his

spare time than at the airport so he had towed it to his home (minus wings) from Highland Park Airport in North Dallas where it is usually based.

I think this picture gives promise to the day when there will be a plane in every garage.

JOHN NANCE
Dallas, Tex.

SCORES TIME COSTS

I do quite a bit of traveling throughout the country for one of the larger wholesale houses. As a result I have had a good

(Continued on page 6)

Now you can fly with the world's most advanced automatic pilot for light executive and private aircraft—the Sperry SP-3 Series—confident in the knowledge that it meets FAA Technical Standard Order regulations for *airliner* equipment. It has already been certificated for the Cessna 310; the Piper *Apache, Comanche* and *Aztec;* the Aero Commander, and the Model 18 Beechcraft. Other certifications are forthcoming.

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MAILBOX

(Continued from page 4)

opportunity to see aviation as it exists throughout the U.S.A.

Frankly, I am not used to writing letters to the editor, but in this case I felt obligated to do so.

I am referring to the article "Wiggins Wagons" (by T. Z. Eliot) in your August issue. On page 82, there is a breakdown of his rates, in particular the $18 for a 90-hp Cub and $25 for a Tri-Pacer (dual). Or solo time for the Tri-Pacer of $19 per hour. In my opinion these rates are unthinkable.

Mr. Garside goes on to defend his rates, at least to his own satisfaction, that a man who will spend $10,000 for an airplane doesn't mind spending a few extra bucks for instruction.

Anyone who wonders what has happened to private flying, can look to this article for the answer. It is all well and good, this boom in executive aviation, but what of those who cannot afford these high prices? They will not be flying.

I usually manage an hour or two each week at an airport. However, I am afraid that if this general attitude to favor the big-money boys persists I will be forced to give up my one great love, that of flying for its own sake.

Something must be done . . . I believe the answer lies chiefly with the operators, first to lower their rates to something within reason. . . .

I have been flying for 15 years and shudder to think what flying in America will be in another 15 years if this problem is not solved. The operators should just remember that some of us still have to drive Fords. We can't all drive Cadillacs.

FRANK TAYLOR

San Antonio, Tex.

OBSCURED ENGINE

In recent issue of FLYING in the "Newsreel," you showed an Aero-Plane that is identical to the Aerocar. You reported it had a 143 hp Lycoming engine; but where is the engine located?

JIM MCKEAN

Midland, Ontario

• *At rear of cabin, driving a tail propeller through a long shaft.*—ED.

INSTRUMENT RATINGS

I feel compelled to reply to the remarks of Sgt. Bruce Newton in August "Mailbox" wherein he states, "If one is a fair-weather pilot he will never become a full-fledged aviator, and since instrument flying separates the men from the boys, . . ." Hog wash!

I would estimate that not more than five per cent of the agricultural and bush pilot group have instrument tickets and, mister, if the vast majority of the rest of them are not men, then there are no men in aviation.

At one time I held an instrument rating, but during the 9,000 hours I have logged since the war in the mountains of southern Colorado and the canyons of southeastern Utah, there has not been a time that I have had need for instrument rating. I have piloted very close to 500,000 passenger miles in single-engine craft in the past three years. At one time I flew on schedule two flights daily, seven days a week, for eight months. Perhaps he would consider all this fair-weather flying.

The sergeant is right on one point. "It is not what we know that hurts us, it is how we use it." Some things we don't know won't hurt us either, if we use a little common sense.

JIM HURST

Green River, Utah.

FIVE-HOUR PILOTS

I have read Mr. Duckworth's article in the April issue ("What the New Private Pilot Requirements Really Are"); also the one in your July issue ("Sound Instruction For the Private Pilot.").

I would like to know what Mr. Duckworth's reaction will be when he meets one of these five-hour instrument-rated (?) pilots at 10,000 feet head-on with 10 feet visibility. (They do it you know—plenty of them!)

LEE GILMER

Gainesville, Ga.

NAV-COM GUIDE

Congratulations on your splendid first article on a guide to Nav-Com Equipment (by B. V. Deltour, August issue).

Some years ago I laughed when a flying friend told me that it was more important to have good radio equipment than to have a good airplane. Since then I have learned there is much truth in what he said. Your article is a big help on this important subject.

C. RYMAN HERR JR.

Stonehenge, Stanton, N. J.

V-8 FORD-POWERED AIRPLANES?

. . . Have heard of putting Ford engines in airplanes, but have never seen a photograph of this.

An airline pilot here says he saw some at Yellowstone National Park. Does anyone connected with FLYING know anything about this?

ROBERT VANEE JR.

Huntington Station, N. Y.

• *There were several of these. Arrow Aircraft and Motor Corp. of Lincoln, Nebr., manufactured, in 1936, the "Arrow Sports V-8" (see photo), powered by a converted Ford V-8 engine. An open-cockpit, two-*

place, low-wing monoplane which held an approved type certificate, it was one of several models made by this company. At St. Joseph, Mo., Campbell Aircraft Co., manufactured a two-place cabin monoplane with a 100-hp converted Ford V-8 engine. In Oregon, there were also a number of home-built aircraft powered by Ford Model T and A engines. There were other light aircraft built during the 30s around the Plymouth and Studebaker engines.—ED.

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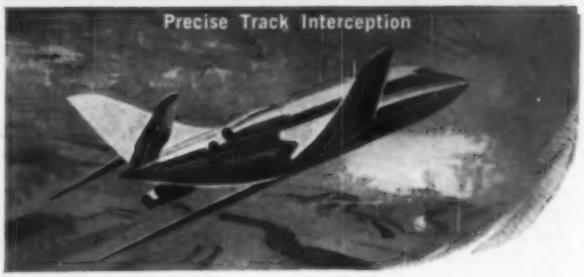

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Briefings . . .

FOR THEIR CALMNESS and dispatch in directing a pilot in extreme difficulties to a safe landing at Ontario (Cal.) airport, air traffic controllers, Joseph Cossey Jr., and William Brown (left) receive the first Nova-Tech "Man Behind the Mike Award" from Sidney P. Held (right), president of

Nova-Tech, west coast manufacturers of aircraft radio and navigation equipment. The award—a gold plaque and $100 savings bond—was established to honor the FAA tower operator who makes an outstanding contribution to flying safety by his quick and cool action in assisting a pilot in trouble.

MCCAULEY INDUSTRIAL CORP., Dayton, O., manufacturers of propellers for business and private airplanes, has become a wholly owned subsidiary of Cessna Aircraft of Wichita, Kan. No purchase price was disclosed by the principals. Cessna's vice-president and treasurer, Frank A. Boettger, is appointed president of the newly acquired company. Vernon Deinzer, formerly executive vice-president of McCauley, has been elected vice-president and general manager in charge of the Dayton operation.

TOP PLACE in the U.S. National Soaring Competition, held at Odessa, Tex., August 2-11, went to Richard Schreder of Toledo, O., second-time winner, flying an HP-7 glider of his own design. Schreder, who placed 15th in recent International Soaring Meet at Cologne, Germany, and got himself in the news for inadvertently straying into East Germany, was one in a field of 35 contestants at Odessa. Second place went to Bernard Carris of Big Flats, N.Y. (near Elmira) in a Ross-Johnson RJ-5 while, from Tecumseh, Mich., A. J. Smith in an Lo-150 (of German design) took third-place honors.

BEE AVIATION, Montgomery Field, San Diego, Cal., is for sale, according to Ken S. Coward, engineering vice-president. The company, which manufactures the single-place Honey Bee and four-place Queen Bee, is asking about $20,000 for the Honey Bee program, including an FAA certified prototype, and $50,000 for the Queen Bee program, including major assemblies for two additional airplanes. The Honey Bee, powered by a 65-horsepower Continental A-65, has a top speed of 123 mph and cruise speed of 110 mph. Powered by a 180-hp Lycoming A-360, the Queen Bee cruises at 145 mph, with a top of 155 mph.

FROM SUD AVIATION of France, General Electric has accepted delivery of the first American-purchased Caravelle jet liner. The twin-engined plane will undergo engine changes at GE's flight test center at Edwards AFB, Cal., following a nationwide demonstration tour co-sponsored by Sud and Douglas Aircraft. The latter is licensed to sell and service the Caravelle in the U. S. and other countries. The engine changes calls for replacement of the present powerplants to GE's CJ-805-23 aft-fan engine of 16,100 pounds thrust.

BY MID-1963, FAA will require improved airborne radio equipment for general aviation aircraft when operating under IFR conditions, according to James T. Pyle, deputy administrator. Only air carriers are required to have such equipment at present. Corporate and utility aircraft, and more advanced private aircraft, will be particularly effected by the requirements.

A LIMIT ON AIRLINE trip insurance of $165,000 has been set at Washington National Airport by FAA. According to E. R. (Pete) Quesada, FAA administrator, insurance companies have been asked to submit proposals cutting the present maximum of $425,000, in keeping with maintaining the impressive safety record established by air travel.

BY IMPRESSIVE MARGINS, the U. S. Army, with its turbine-powered Bell HU-1, has surpassed three Russian-held world helicopter records and four other international rotary-wing marks. Records—unofficial until recognized by the FAI—were based on the following flights by the Army's Iroquois over an eight-day span: time to climb to 9,843 feet, three minutes, 22.4 seconds; to 19,868 feet, eight minutes, 10.2 seconds. Nonstop distance over closed course; 441.74 miles. Speed runs: 1.864 miles, 158.05 mph; 310.7 miles, 148.45 mph; 62.14 miles, 142.2 mph.

TRADITION GONE WITH WIND, Capt. John H. Sever, San Francisco bar pilot, is flown by helicopter and put aboard the liner President Cleveland to guide the ship through the Golden Gate. The air-sea operation, reported the first of its kind in the harbor pilots' proud profession, took

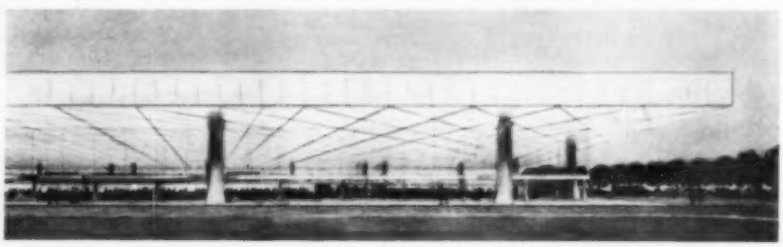
nine minutes instead of the customary two-hour boat trip. Rick Helicopters, Inc. provided the charter service, using a Hiller 12-E, piloted by Richard L. Peck. An experimental operation, this, in time, may mark a radical change in the harbor pilots' traditional routine.

WITH BOTH CORPORATE DIRECTORATES having approved the proposed merger of Capital Airlines into United Air Lines, the carriers have set October 14 as the date for stockholders to vote on the proposal. Subject also to stockholder approval is proposed financing arrangement with Vickers-Armstrong, Ltd., on Capital's equipment obligations, already approved by the former. Final approval of the merger rests with the Civil Aeronautics Board, whose Bureau of Operations has already taken steps to expedite the case.

MISS JERRIE COBB is planning to take a crack at regaining the world's altitude record for 4,000-6,000-pound aircraft during NBAA convention (Sept. 20-22). Aircraft will be an Aero Commander 680F, latest of Aero Design's new models, just now beginning to roll off the production line.

MERGER NEGOTIATIONS between Hiller Aircraft Corp., Palo Alto, Cal., and the Electric Autolite Co., Toledo, O., are well under way. Under the proposed arrangement, the net assets of Hiller, a leading factor in the light helicopter field, would be acquired by Autolite, prominent

(Continued on page 12)



FAST SHAPING UP into the world's most beautiful center of modern architecture, New York's International Airport will see its 10th air terminal—a two story, city-block-long, all glass rectangular structure—under construction by mid-1961. A replacement for the "temporary" quonset makeshift first opened in 1947, this new multi-airline terminal (above) is designed by I. M. Pei & Associates, New York architectural firm which was declared winner over four competitive firms by a distinguished Jury of Awards selected from the architectural field.

Mobil

FLY WEATHER-WISE

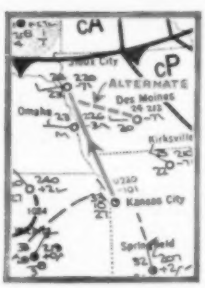
These weather items prepared in consultation with the United States Weather Bureau

FLIGHT PLANNING

CEILINGS AND VISIBILITY

The Civil Air Regulation's "Visual Flight Rules" state that all VFR flights must remain clear of clouds—1000 ft. above, 500 ft. below, and 2000 ft. horizontally in uncontrolled air space. An altitude of 700 ft. or more must be maintained in control zones (near airports) and control areas (along airways). Ceilings of 1000 ft. are required in control zones. In continental control areas cloud clearance must be 1000 ft. above, 1000 ft. below, and 1 mile horizontally.

IN planning VFR flights, you must determine that visibilities along your proposed route are at least 1 mile at all times—3 miles in control zones and control areas and 5 miles in continental control areas. This can be done in the following ways: consult your local Weather Bureau office and check latest weather reports; check latest forecasts and compare with preceding ones to judge trend; look for special advisories, pilot reports (PIREPS); note frontal weather near your flight path—even weak fronts can cause problems later during flight; study terrain—ceilings that appear high enough to permit flying underneath may not allow you to clear mountains. Remember, haze, smoke and precipitation—especially snow—may reduce visibility below VFR limit. Keep tuned to area FAA—FLIGHT SERVICE Stations for up-to-date meteorological reports and Flash Advisories.



If weather at your destination appears questionable, pick an alternate in a different air mass or weather regime. Also, check the winds aloft, and make certain that you will have sufficient Mobilgas Aircraft to reach your alternate.

* * *

Mobil, too, helps you in planning trouble-free flights by providing you with aviation products of the highest quality . . . fuels and lubricants that are famous throughout the world for dependability and performance! And Mobil's 57 years of aviation service and experience is your assurance that you're getting the most advanced petroleum products available! So, remember . . . Fly Weather-Wise! . . . Fly Mobil!

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you make a Wise Decision...

when you purchase the NEW HOWARD "500"

The World's Most Useful Business Aircraft

Wise decisions are made by knowing and comparing the facts. Compare and see how the Howard "500" has more to offer the Business User than any other aircraft.

NEW The Howard "500" is a *NEW* production 4b transport category aircraft. It is *NOT* a modification.

Saving

You cannot approach the capability of the "500" in any other new 4b transport category aircraft without investing $400,000 more than the Howard "500", with the same equipment. You cannot actually match the versatility and pressurization advantages of the "500" in any other aircraft regardless of the price.

Pressurization

The Howard "500" is the only business aircraft that never exceeds a 5,000 ft. passenger cabin. It will actually deliver maximum range with a sea level cabin and flies at its optimum best speed and range altitude with only a 2,900 ft. cabin. All comparable turbo prop aircraft have over an 8,000 ft. cabin when delivering maximum *advertised* range.

Advertising

The advertised *speed, range* and *pressurization* of the Howard "500" can be achieved *simultaneously* at average prevailing temperatures. This is *not* so for turbine aircraft.

Versatility

The Howard "500" flies *high* to take advantage of favorable winds and weather. It also can fly *low* without a serious range or speed penalty when the weather and winds are adverse at the higher level. This versatility is not achieved with the turbine powerplants. For these reasons many flights can be made in the Howard "500" that will require a fuel stop in the turbine powered aircraft.

Speed and Range

The Howard "500" has a normal range of 2,600 miles plus reserve at a cruising speed of 350 mph. This is accomplished with a 2,900 ft. *cabin altitude* and 8 to 10 passengers and baggage. The flight could also originate from a 4,300 foot runway meeting the 4b transport runway requirements.

Growth Potential

Jet Augmented Thrust by adding one tail mounted jet engine would give the Howard "500" a cruising speed well above 400 mph, while maintaining a 5,000 ft. passenger cabin. Existing structure in the "500" is adequate for speeds of 480 mph at 25,000 ft.

For further information write, wire or call TAylor 4-2411
Howard Aero, Inc. Mfg. Div. Box 8247 San Antonio, Texas

Briefings . . .

(Continued from page 8)

automotive and aircraft parts manufacturers, on a basis of one share of Autolite for each four-and-one-quarter shares of Hiller. Hiller will continue operations as a separate unit with Autolite's newly formed Aero/Space division cooperating in research and development.

ASSUMING A NEW COMMAND on Okinawa, USAF Col. Francis S. Gabreski displays models of the two jet aircraft which have played a leading role in his career during the past 10 years. At right, a North American F-86 Saberjet with which he de-

stroyed six-and-one-half Communist MIGs in Korea and became history's eighth jet ace; and (left) an F-100 Super Sabre which he flies today. The now be-ribboned colonel, became a leading ace during WW II in Europe by destroying 31 enemy aircraft while flying propeller-driven fighters.

IN GREEN RIVER, UTAH, the Green River Aviation Company has acquired a supplemental type certificate to convert the four-place Cessnas 180, 182, and 175 into a five-place aircraft. There is no increase on gross-weight limits, according to the company's James W. Hurst who also advises that kits are available for these conversions.

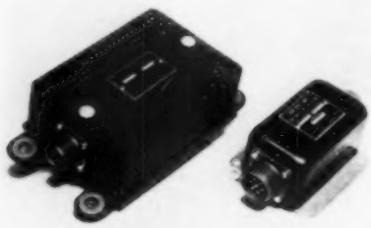
MANUFACTURERS OF the Dynavia ANC-3A Auto-pilot Omni Coupler, (Controller portion of which is shown below), Flight Research, Inc., Richmond, Va., have announced the complete compatability of all models of its equipment with the new

ARC Model CD-4 Course Director, which has been expanded to receive ADF (LF) signals. When operated into the Motorola L-2 Autopilot, the company states this team of equipment makes it possible to navigate automatically using all low-frequency facilities in addition to VOR and LOC stations.

TERMINATION OF the Air Coordinating Committee, a 14-year-old inter-agency group established originally to coordinate Government efforts in aviation, has been ordered by President Eisenhower. FAA already has taken over many responsibilities formerly handled by the committee. However, those functions not under the FAA are to be provided for by other means, including the creation of at least one more committee. Further, the President recommended that FAA set up a representative group from various federal agencies to treat with aviation problems in the international field.

IOWA STATE University Press has published a student pilot manual in recognition of the beginning pilot's need for current and comprehensive information about flying techniques. Generously illustrated, "Student Pilot's Flight Manual," leads the beginner step-by-step through all required procedures for a private pilot's license, including the new instrument training required by FAA. Authored by William K. Kershner, the book is $2.95 from Iowa State Press, Ames, Iowa.

A SMOKE DETECTION system which "sees" smoke in unguarded areas of an airplane and gives an alarm before combustion becomes dangerous, is being marketed by Pyrotector, Inc., of Hingham, Mass. Called "Pyrotector," the device is a visual



one and works on the principle of light reflection. Certified and approved to FAA, TSO and Cla specifications, the system consists of one control amplifier together with one to six smoke detection assemblies (above). Requires 28 volts, plus or minus 15 per cent.

"TOWER COMMUNICATIONS" IS THE THIRD AND LATEST in training records created by Aero Progress, Inc., 10493 Santa Monica Blvd., Los Angeles, Cal., designed to help the pilot develop proper radio skills and habits. This disc ushers the student through the entire realm of tower communications in in-flight procedures, ending with an actual lost-aircraft problem involving the use of direction finding equipment by the tower. Price of $5.98 includes 20-page manual.

BEECH AIRCRAFT PILOT, James D. Webber, has received official recognition from FAI (Federation Aeronautique Internationale) for a new world's altitude record for aircraft in the 4,000-6,000-pound category. Six months ago Webber reached an altitude of 34,500 feet in a Beech, twin Lycoming-powered, Queen Air 65, thereby dethroning Miss Jerrie Cobb of Oklahoma who held the record with the Aero Commander.

ROLLS-ROYCE OF CANADA (Montreal) has installed James Wood, previously director of technical sales, Aero Division, of the parent company, as vice-president and general manager, to succeed R. M. Kendall who has served with the Canadian branch since its formation in 1952. Mr. Kendall returns to England to the post of general manager Aero Division, in charge of promotion and service of Rolls-Royce aero engines on a world-wide base, including Canada and the U. S.

VAN DUSEN AIRCRAFT SUPPLIES has opened a new branch office, the eighth in its chain, at DeKalb-Peachtree Airport, Atlanta, Ga. Headed by Carl Eaby, transferred from Van Dusen's Miami (Fla.) branch, the Atlanta facility includes salesroom, offices and warehouse.

AVIATION SERVICES CO., a group of experienced pilots and aviation specialists primarily concerned with multi-engine aircraft for business and industry, has established offices at 2 Sheridan Ave., Bethpage, Long Island, N. Y. Six plans are offered by the group with complete cost and technical breakdowns for firms contemplating use or purchase of business aircraft. Additionally, ASC offers pilot training and operates an aircraft leasing and rental division. A brochure "Wings for Business and Industry" is available upon request.

ONLY SLIGHTLY BIGGER than a cigarette pack, this miniature four-ounce seat belt attachment is designed to reduce a typical 5,100-pound crash impact to a withstandable 1,500-pound (9gs) shock on passenger and seat. Called Lap Belt Energy

Absorber, the new device operates by simple principle of metal yielding and deforming at a constant rate to absorb shock in split seconds. It is a new product of Teco, Inc., Burbank (Cal.), designers and manufacturers of aircraft seating systems.

A POWER-PACKAGE Subscriber Program, expected to save Gulfstream owners $12,500 annually over a five-year period, is announced by Atlantic Aviation's Wilmington Division. The program, worked

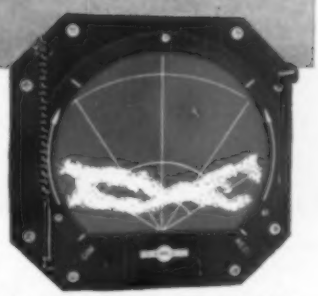
(Continued on page 128)

New lightweight weather eye for business aircraft

Same full service at half the weight

Collins transistorized WP-103 Weather Radar System weighs only 49.9 pounds. New low volume and power requirements make the WP-103 the best buy yet. And Collins modular construction simplifies maintenance. The WP-103 has a new, fully stabilized antenna available in 12″ or 18″ dish to fit any space requirement.

Accurate, continuous picture of weather conditions 150 nautical miles ahead of the aircraft in a 120° sweep, ±15° tilt... a special Iso Echo contour feature clearly defines corridors of milder weather, and sharp, black areas of intense activity. A new bright tube, daylight-type indicator needs no cumbersome scope hoods.



Let Collins give your aircraft a new lightweight weather eye — the WP-103. Contact your nearby Collins Distributor, or write Collins direct for further information.

COLLINS

COLLINS RADIO COMPANY • CEDAR RAPIDS, IOWA • DALLAS, TEXAS • BURBANK, CALIFORNIA

SAFER, FASTER, SM

the all new SPEED-LINE

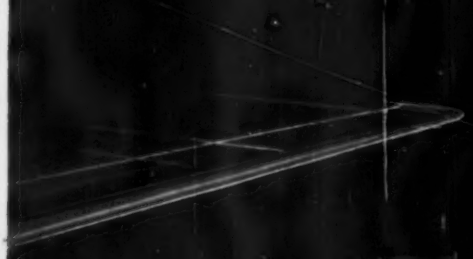
500A 500B 560F

No other business twin combines so many essential

AERO DESIGN & ENGINEERING CO • BETHANY, OKLAHOMA

OOTHER, QUIETER

MMANDER



Even greater single engine capabilities than before, greater short field flexibility add to the flying safety of the Aero Commander.

New Speed-Line nacelles—actually an airfoil design—and increased power provide improved rates of climb, speed and performance!

Smooth-running fuel injection engines, new dynamic propeller balancing, forged engine mounts add greatly to Aero Commander's smoother-flying comfort.

The whisper-quiet cabin is the result of an over-the-wing exhaust system and a more effective method of sound insulating.

No other aircraft in its class provides the safety, performance and comfort of the all-new Aero Commander.

Fly it once and you'll know why. Contact your nearest distributor for details—today.

680 F

features so well

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THUNDERBIRDS

World's first supersonic precision aerobatic team the U. S. Air Force Thunderbirds! Brilliant pilots, each is also a "scientist" with years of research to back his in-the-air mastery. Demonstrating the ultimate in precision maneuvers, with wing tips overlapping at "broom stick" clearance, their speeds range up to a spine-chilling 730 m.p.h. at the lowest altitudes. More than 21 million international spectators have seen their "Century Series" fighters go through their thrilling punishing paces . . . You've got to see them to believe them!

Like the aircraft of the famed "Thunderbirds," the Rolex Oyster Perpetual "Thunderbird" is an unerringly precision-dependable part of their equipment . . . You've got to see it to believe it!

THE THUNDERBIRD: Rolex DATEJUST. 18 K Gold case with "Turn-O-Graph" bezel. 25 Jewel chronometer, as identified by the Rolex Red Seal. Rotor-self-winding PERPETUAL movement, completely protected by the famous waterproof Rolex OYSTER case. New cyclops crystal magnifies date for easy readability. With strap, $550.00 F.T.I., bracelet extra.

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AMERICAN ROLEX WATCH CORP., 580 FIFTH AVENUE, NEW YORK

HAVE YOU READ?

BY JAMES F. SUNDERMAN

FLIGHTS OF FANCY, by Frank K. Smith (Random House, 457 Madison Ave., New York 22, N.Y., $3.95).

It was a copy of FLYING magazine that led Philadelphia lawyer Frank K. Smith into the ranks of the private pilots. Learning to fly transformed his life. It turned out to be the one prescription that proved a cure for nervous breakdown.

Many will remember Smith's first book "Weekend Pilot." He now continues his flying-literary pursuits in "Flights of Fancy," a light, meaningful and informative account of his exhilarating flight adventures in a Piper Comanche named "Fancy." He shares these new horizons with his wife, his three sons, and the family poodle. Flying the airways, navigation, weather, flight planning, ground servicing and accommodations number among the topics he covers. Most important to him, however, is the use of "Fancy" as an aerial classroom for showing his sons America first. For the private flyer, the student pilot, the skeptic and the hopeful, this book will prove an inspiration.

GHOST SHIP OF THE NORTH POLE, by William Cross (William Sloane Associates, 425 Fourth Avenue, New York 16, N. Y., $5.00).

The age of lighter-than-air craft is marked with tragic disasters, one of which was the crash of the airship "Italia" on the Arctic ice pack on May 25, 1928. Here is the full story of how the great airman Umberto Nobile planned and executed this pioneer aerial voyage without the support of his country. Author Cross skillfully recaps the flight, the crash, the incredible ordeal of survival on the frozen ice and the eventual heroic rescue of the marooned crew. Few eras in the history of flight have been as well documented in book form as that of the dirigible. This volume adds another chapter of this period when man's personal efforts and his vision exceeded the capabilities of technology.

FIGHTER AIRCRAFT OF THE 1914-1918 WAR, compiled by W. M. Lamberton and edited by E. F. Cheesman (Harleyford Publications, England, $8.50, distributed by Aero Publishers, 2126 Sunset Blvd., Los Angeles 26, Cal. and Acme Code, 507 W. 33rd St., New York 1, N.Y.)

Fourth in a distinguished line of "Harborough" books documenting the history of World War I in the air is this photo-narrative-statistical survey of more than 300 fighter aircraft of six nations—U.S., Austro-Hungarian, British, German, Italian, and French.

The book covers in text, photo and full-page 1/72-scale 3-view drawings, 84 operational, near-operational and experimental fighters of the war. They are accompanied by specification tables, lists of all units known to have been equipped with these aircraft. Included are 150 close-ups of aircraft parts, machine guns and mountings, engines as well as cockpit layouts.

THE CROWDED SKY, by Hank Searls (Harper, and Brothers, 49 E. 33rd St., New York 16, N.Y., $3.95).

This second major air novel by Hank Searls (author of "The Big X") deals mainly with technicalities of air operations, airways flying and ground control communications. The situation involves an eastbound Navy jet and a westbound commercial airliner, complicated by heavy air traffic, darkness of night and soupy instrument weather. The infallibility of instruments, the cold statistics of a rigid flight plan, the thread of radio communication to ground control are pitted against the mechanical limitations of equipment, human error, the gnawing of personal problems among crew and passengers, and a lack of understanding between two men: one on ground control and the other in the cockpit.

Such are the ingredients of this dramatic suspense story, Literary Guild selection and future Warner Brothers movie.

WIND ON MY WINGS, by Percy Knauth (Doubleday, 575 Madison Avenue, New York 22, N.Y., $3.95).

In a style reminiscent of the feeling and depth of airman-writer Wolfgang Langewiesche, Percy Knauth creates a portrait of the flyer's world that long will be remembered.

Knauth is articles editor for *Sports Illustrated*. During WW II he became a war correspondent in Europe, a job that richly qualified him to contribute later many articles to the national slick magazines. For over 30 years he dreamed of the day he could be master of his own plane, free and independent, to explore the magnificence of the world aloft.

His book relates the story of this dream fulfilled. It relates in beautiful, almost poetic, phrases experiences, feelings and observations from solo to his greatest conquest—a Piper Apache flight across the Atlantic with Max Conrad.

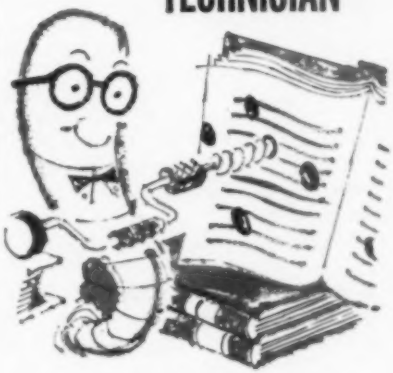
In a deft, almost mysterious way Knauth teaches flight as he writes, an experience the reader is not aware of, except in reflection.

Throughout the volume Knauth's articulate, philosophical style sketches a journey through the world of flight pointing out the many skills of airmanship. The book is a rare occurrence in aviation writing. Airmen everywhere should not miss it.

If you're not a bookworm . . .

but love to tinker with tools

STEP OUT AS AN AIRFRAME & POWERPLANT TECHNICIAN



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For other courses, see pages 86, 96

The Business Aircraft in Perspective

GILL ROBB WILSON
Publisher

ARE EXECUTIVES harried for time and opportunity for on-the-spot decisions?

Is management strained for lack of readier supervision?

Is engineering and other special talent wasted for want of greater mobility?

Would emergency customer service strengthen the competitive position of the company?

Could business be improved by multiplication of sales contacts within the established pattern?

Are there segments of that pattern which might profitably be expanded without increase of sales personnel?

Does the company have a problem in keeping abreast of the latest technological developments; in awareness of competitive methods and installations?

Of what benefit to policy planning is first-hand observation of market trends?

Does the matter of inventory plague the purchasing department?

Analysis of these and kindred considerations of both general and special nature is the function of management. The aggregate conclusions reached in the case of each company should determine for or against the acquisition or rental of a single plane or fleet of business aircraft, type, performance, and assigned objectives.

Among us airmen, preplanning for flight long has been a primary requirement of successful operation; and as permissible margin for error decreased in high-performance aircraft, requirement for preplanning has increased. Not that we are able to assign an arbitrary value to preplanning but that, without such, we could not have built an industry, a transportation system, an air defense—perhaps not even survived.

Observing the adaptation of privately owned aircraft to American industry and business, it seems to me that corporate management might also take to heart that preplanning is the key to profitable utilization. Without such, the corporation can be fair neither to self nor to the aircraft as a business tool.

There has been an exceptional volume of data compiled on corporate aircraft costs—original costs, costs per mile, costs per passenger, costs versus other forms of transportation, costs versus scheduled air travel. And there has been much testimony about prestige value and saving of away-from-home expense.

This is all relevant in that it dispels the myth that a business aircraft is a devouring demon of dividends or an aerial version of a millionaire sportsman's yacht, but it does not get to the heart of decision—should a company have its own plane or planes or should it not.

That answer must come from management's analysis of the tools it needs to make its people more effective, to improve its competitive position, to best serve its market, and to grow. The appropriate business aircraft purchased to serve soundly conceived objectives and so utilized will swiftly become indispensable. The aircraft purchased and utilized without such planning is a mere gamble both for the manufacturer and the customer.

I note a tendency to measure the value of a business aircraft in terms of hours flown. Here again is a certain relevancy but this criterion, too, misses the heart of the matter. Probably we airmen are largely responsible for the fallacy it contains. We long have erroneously used hours to measure experience values. What kind of hours? Hours in fair weather? Hours on instruments? Hours in circling an airport? Hours flying an airliner? Hours in experimental test? Hours ipso facto mean little. Productivity is the only true criterion.

Not how often or how long a business plane flies but the decisive contribution it makes to its assigned objectives is the measure of its worth. Did it save a valuable account by emergency service? Did it get a scientist to a laboratory in time to monitor a critical research project? Did it take the monkey off management's back in a competitive situation? Did it expand a market radius? It may easily have paid for itself as readily in two hours of flight as in two hundred.

Above and beyond all other criteria of value of the business aircraft, however, it seems to me, is its creative function. It is enabling industry to disperse to fresh sources of raw materials, to utilize untapped labor reserve in the grass roots, to take advantage of a myriad of unexploited opportunities. Satellite business airports and flight strips are the seeds of new industrial complexes and of new cities. The community of tomorrow without facility for the business plane will also be without business. Fresh concepts of business methods are among the most exciting prospects of our times. Herein is a frontier more meaningful to future generations than any other one aspect of our living standards. The business plane will be no less historic in final analysis than its more spectacular counterparts in scheduled commerce and military employment. Its only problem is sound perspective.

As an aid to this perspective, tables of available equipment and its performance will be found in following pages. Study of them is commended. The right tool rightly used is the criterion of business flying.

Dear American Airlines:

I average 50,000 miles per year on commercial airlines - so I recognize good service when I see it. My flight was made unusually pleasant – thanks to your Miss Clare Vize and Miss Valerie Franks. I'd like to have them in my public relations department!

W. E. Uzzell

UNSOLICITED IN-FLIGHT LETTER FROM MR. W. E. UZZELL, V. P. OF ROYAL CROWN COLA CO., COLUMBUS, GA.

Our Stewardesses, Mr. Uzzell, are another reason why American Airlines is first choice of experienced travelers. We choose just 1 in 23 from over 15,000 annual applicants for an intensive 77-subject course at our Stewardess College, the only one of its kind. The young ladies graduate with honors in the gracious art of making people happy.

AMERICAN AIRLINES
America's Leading Airline

Some 9,000 new aircraft should be sold this year. Sales will jump again in 1961. For a look at what's ahead, in production and design, read this report on

FIXED-WING AIRCRAFT

By FLYING STAFF

Piper Aztec

Piper Tri-Pacer

Piper Comanche 180

Beech Debonair

Beech Queen Air

Aero Commander 500B

UNRESTRAINED OPTIMISM dominates the business plane market as 1960 sales records set the pace for the new decade. Nine-month performance by major utility plane manufacturers show gains far greater than was estimated.

Since the number of utility and business aircraft sold and placed into operation doubled from 1950 through 1959, projections for the early Sixties will be left at the starting gate if present trends hold.

Conservative estimates on future growth project 120,000-plus units in operation within the next decade compared with today's 70,000 active civil aircraft reported by the Federal Aviation Agency. Hours flown are expected to grow from a 1960 average of 12-million to 20-million by 1970.

Sales reported thus far this year for major light-twin and single-engined aircraft are running from 18 per cent to 40 per cent higher than last year. More than 9,000 new aircraft could be delivered this year, as against 7,689 shipped in 1959. Beech, Cessna and Piper are exceeding all estimated gains. New models are being planned and sales organizations are being strengthened.

The most realistic and significant signpost to the future points to the simple fact that business at last has

PERSONAL & BUSINESS FIXED-WING AIRCRAFT

MANUFACTURER	Aircraft designation and Model No.	Number of Seats	Span	Length	Height	Wing Area (sq. ft.)	Weight empty (lbs.)	Maximum gross weight (lbs.)	Powerplant (number, make, model, rating)	Cruising speed (mph)	Maximum speed (mph)	Take-off (over 50 ft.)	Landing (over 50 ft.)	Fuel capacity (gallons)	Maximum range (miles)	Service ceiling	Basic price
Aerocar, Inc. *Longview, Wash.*	Aerocar	2	34′	21′6″	7′6″	190	1,500	2,100	Lyc. O-320 143 hp (der)	100	117	1,250	720	24	300	11,000	$9,995
	Aero-Plane	4	34′	22′6″	7′6″	190	1,200	2,200	Lyc. O-320 143 hp (der)	110	125	1,250	720	24	330	13,000	$9,995
Aero Design & Engineering Co. *Bethany, Okla.*	Aero Command'r 500A	7	49′6″	35′1″	14′6″	255	4,075	6,000	2 Cont. I0-470 260 hp ea.	217	228	1,200	1,130	156	1,800	23,500	$72,000
	Aero Command'r 500B	7	49′6″	35′1″	14′6″	255	4,300	6,750	2 Lyc. I0-540 290 hp ea.	218	228	1,550	1,650	223	1,250	20,500	$81,500
	Aero Command'r 560F	7	49′6″	35′1″	14′6″	255	4,650	7,500	2 Lyc. IGO-540 350 hp ea.	232	248	1,250	1,375	223	1,500	21,900	$98,500
	Aero Command'r 680F	7	49′6″	35′1″	14′6″	255	4,800	8,000	2 Lyc. IGSO-540 380 hp ea.	244	290	1,380	1,330	223	1,400	28,500	$113,500
Aircraft Marine Engineering Corp. *Van Nuys, Cal.*	A-1 Auser	9	46′	39′	11′	260	4,100	9,000	2 Cont. 420.M 1,200 lb/t ea.	NA	460	NA	NA	480	1,650	NA	$190,000
	A-2 Avocet	26	72′	60′	19′	650	10,250	24,000	4 Cont. 420.M 1,500 lb/t ea.	NA	450	NA	NA	1,600	2,600	NA	$500,000
Beech Aircraft Corp. *Wichita, Kan.*	M35 Bonanza	4-5	33′5½″	25′2″	6′6½″	181	1,832-1,847	2,950	Cont. IO-470C 250 hp	200	210	910	1,130	50 st. 70 opt.	910 1,245	20,000	$25,300
	33 Debonair	4	32′10″	25′6″	8′3″	177.6	1,730	2,990	Cont. IO-470J 225 hp	185	195	NA	NA	49 st. 68 opt.	845 1,170	19,800	$19,995
	B95 Travel Air	4-5	37′10″	25′4″	9′6″	199.2	2,635	4,100	2 Cont. 0360 180 hp ea.	200	210	1,200	1,590	84 st. 112 opt.	1,160 1,410	18,700	$51,500
	D50C Twin Bonanza	6	45′11¾″	31′6½″	11′4″	277	4,100	6,300	2 Lyc. G0480 285 hp ea.	203	214	1,260	1,455	134 180	823 1,100	20,000	$83,000
	65 Queen Air	6-8	45′10″	33′4″	14′2″	277	4,700	7,700	2 Lyc.IGS0480 320 hp ea.	214	239	1,560	1,685	180 230	910 1,210	27,000	$120,000
	Super G-18 Hartzell prop	7-9	49′8″	35′2½″	9′8″	360.7	5,950	9,700	2 P&W Wasp, Jr. 450 hp ea.	214	223	1,980	1,850	272 318	1,314 1,536	21,000	$126,000
	Super G-18 Ham.Stand.prop	7-9	49′8″	35′2½″	9′8″	360.7	5,950	9,700	2 P&W Wasp, Jr. 450 hp ea.	215	226	1,800	1,700	272 318	1,330 1,571	21,500	
Briegleb Aircraft Co. *Adelanto, Cal.*	BG-12A	1	50′	21′11″	5′7″	139	N.A.	N.A.	NONE (Glider)	45	.....	.....	.....	.....	.....	.....	Kits from $895
CallAir, Inc. *Afton, Wyo.*	150 A-5 (agr)	2	35′5″	23′10″	7′10″	186.1	1,020	2,150	Lyc. O-320 150 hp	82	104	NA	NA	25	300	17,500	NA
	180 A-6 (agr)	2	35′5″	24′1″	7′10″	186.1	1,170	2,350	Lyc. O-360 180 hp	83	107	NA	NA	40	490	17,500	NA
Cessna Aircraft Co. *Wichita, Kan.*	150	2	33′4″	21′6″	6′11″	160	946	1,500	Cont. O-200-A 100 hp	121	124	1,205	1,055	26	630	15,300	$7,250
	172	4	36′	26′4″	8′11″	174	1,252	2,200	Cont. O-300-C 145 hp	131	140	1,370	1,115	42	790	15,100	$9,450
	175	4	36′	26′6″	9′6″	174	1,339	2,350	Cont. GO-300-C 175 hp	140	147	1,340	1,155	52	755	15,900	$11,600
	Skylark	4	36′	26′6″	9′6″	174	1,420	2,350	Cont. GO-300-C 175 hp	142	149	1,340	1,155	52	760	15,900	$13,050
	180	4	36′	26′	7′6″	174	1,530	2,650	Cont. O-470-L 230 hp	160	170	1,080	1,330	65	845	21,500	$14,675
	182	4	36′	27′1″	9′9″	174	1,550	2,650	Cont. O-470-L 230 hp	157	167	1,080	1,310	65	835	19,800	$14,890
	Skylane	4	36′	27′1″	9′9″	174	1,632	2,650	Cont. O-470-L 230 hp	160	170	1,080	1,310	65	845	19,800	$17,325
	210	4	36′6″	26′5″	8′2″	175.5	1,735	2,900	Cont. I0-470 260 hp	190	199	1,135	1,190	65	1,100	20,700	$22,450
	310D	5	36′	29′6″	10′	175	3,037	4,830	2 Cont. I0-470 260 hp ea.	220	242	1,395	1,720	102 std. 133 opt.	1,440	21,300	$59,950
Champion Aircraft, Inc. *Osceola, Wis.*	7EC Traveler	2	33′5″	22′1″	7′	165	929	1,450	Cont. C-90-12F 95 hp	112	126	NA	NA	26	500	NA	$6,320
	7FC Tri-Traveler	2	33′5″	22′1″	8′8″	165	968	1,450	Cont. C-90-12F 95 hp	108	126	NA	NA	26	475	NA	$6,695
	7JC Tri-Con	2	33′5″	22′1″	7′	165	968	1,450	Cont. C-90-12F 95 hp	108	126	NA	NA	26	500	NA	$6,695
	7GC Sky-Trac	2	33′5″	22′1″	7′	165	931	1,650	Lyc. O-290 140 hp	120	162	NA	NA	39	638	NA	$7,520
	7HC Da'er	3	33′5″	22′1″	8′8″	165	962	1,650	Lyc.O-290 140 hp	120	162	NA	NA	39	588	18,000	$8,120
	7GCB (ag) Challenger	2	34′6″	22′2″	7′	170	1,050	1,650 Part 8 2,325	Lyc. O-320 150 hp	120	162	493	580	39	588	NA	$8,175
	7KC Olympia	2	30′5″	22′1″	7′	150	1,080	1,650	Lyc. O-320 150 hp	135	162	NA	NA	39	658	16,000	NA
Downer Aircraft Industries, Inc. *Alexandria, Minn.*	Bellanca 260	4	34′2″	22′11″	6′4″	161.5	1,690	2,700	Cont. I0-470 260 hp	190	208	NA	NA	40 st. 60 opt.	455 880	22,000	$18,990
Fairchild Engine & Airplane Corp. *Hagerstown, Md.*	F-27	10-18	95′2″	77′2″	27′6″	754	24,650	37,500	2 RR. R Da6 1720 eshp ea.	272	294	2,750	2,090	1,700	2,150	30,900	$700,000 to $800,000
	F-27A	10-18	95′2″	77′2″	27′6″	754	25,200	37,500	2 RR. R.Da7 2105 eshp ea.	300	311	2,450	2,090	1,700	2,000	32,600	$700,000 to $800,000
Flair Aviation Co. *El Monte, Cal.*	FU-24 (agr)	5	42′	31′10″	9′4″	294	1,890	3,500	Cont. O-470 240 hp	111	130	NA	NA	44	410	14,800	$24,290
Forney Aircraft *Fort Collins, Colo.*	Fornaire F-1A	2	30′	20′2″	6′3″	142.6	900	1,450	Cont. C-90 90 hp	121	125	NA	NA	24	500	15,500	$7,340 up

Abbreviations:
Cont.—Continental
Lyc.—Lycoming
P&W—Pratt & Whitney
R.R.—Rolls Royce
opt.—optional
st.—standard
ap.—approximate
eshp—equivalent shaft horsepower
der.—derated
NA—not available

PERSONAL & BUSINESS FIXED-WING AIRCRAFT

MANUFACTURER	Aircraft designation and Model No.	Number of Seats	Span	Length	Height	Wing Area (sq. ft.)	Weight empty (lbs.)	Maximum gross weight (lbs.)	Powerplant (number, make, model, rating)	Cruising speed (mph)	Maximum speed (mph)	Takeoff (over 50 ft.)	Landing (over 50 ft.)	Fuel capacity (gallons)	Maximum range (miles)	Service ceiling	Basic price
Gannett Aircraft, Inc. *Sun Valley, Cal.*	Super Widgeon (amphibian)	6	40′	32′	11′5″	245	NA	5,500	2 Lyc. R-680 300 hp ea.	170	190	NA	NA	158	1,000	NA	$89,950 ap.
Grumman Aircraft Eng. Corp. *Bethpage, N. Y.*	Gulfstream	10-12	78′4″	64′6″	22′9″	615	20,993	35,100	2 RR R.Da.7/2 2190 eshp ea.	350	360	2,800	2,180	1,550	2,600	36,900	$896,000
	Ag-Cat (agr) (spray)	1	35′8″	24′4″	10′9″	326	2,150	3,600	Cont. W 670 220 hp	75	131	1,430	NA	34	220	7,000	$16,400
Helio Aircraft Corp. *Norwood, Mass.*	Super Courier, H-395	5	39′	30′	8′10″	231	2,040	3,920	Lyc. G0-480 295 hp	170	176	475	493	60	850	22,500	$34,980
	Courier H-395A	5	39′	30′	8′10″	231	1,990	3,920	Lyc. G0-435 260 hp	160	166	600	493	60	800	20,000	$31,980
Howard Aero *San Antonio, Tex.*	Howard "500"	12-14	70′4″	57′10″	13′8″	537	21,700	34,000	2 P&W R2800 CB-17 2500 hp ea.	330	350	2,590	3,575	1,550	2,800		$600,000 ap.
Lake Aircraft Corp. *Sanford, Me.*	LA-4 (Amphibian)	4	38′	25′	9′4″	170	1,575	2,400	Lyc. 0-360 180 hp	131	134	1,375	860	40	500	13,000	$24,995
	LA-4A (Amphibian)	4	38′	23′6″	9′4″	170	1,560	2,400	Lyc. 0-360 180 hp	131	134	1,375	860	40	500	13,000	$24,995
Lockheed Aircraft Corp. *Marietta, Ga.*	JetStar (Model 129)	10	53′9″	58′10″	20′6″	542.5	18,447	38,930	4-P&W JT12 3,000 lbs./t ea.	495	540	3,600	3,000	2,630	3,880	38,000	$1,300,000 ap.
McDonnell Aircraft Corp. *St. Louis, Mo.*	Model 119	12	57′7″	66′6″	23′8″	550	NA	40,928	4 P&W JT12 3,000 lbs./t ea.	530	575	NA	NA	2,630	2,810	NA	$1,000,000 ap.
Mooney Aircraft, Inc. *Kerrville, Tex.*	Mark 20A	4	35′	23′2″	8′4″	167	1,440	2,450	Lyc. 0-360 180 hp	180	190	NA	NA	35 49	760 1,075	20,000	$18,000 ap.
Morrisey Aircraft Co. *Santa Ana, Cal.*	Model 2150	2	30′	21′3″	7′	NA	1,125	1,570	Lyc. 0-320 150 hp	148	135	NA	NA	35	525	20,000	$9,500
Meyers Aircraft Co. *Tecumseh, Mich.*	Model 200-A	4	30′6″	24′4″	7′4″	161.5	1,870	3,000	Cont. I0-470 260 hp	204	NA	1,550	1,150	42	1,380	NA	$24,000 ap.
North American Aviation, Inc. *Los Angeles, Cal.*	Sabreliner	6	44′6″	43′9″	16′	342	9,307	17,760	2 P&W-J60 3,000 lbs./t. ea.	490	603	3,590	2,465	1,056	1,725	45,000	NA
Bay Aviation Services Co. *Oakland, Cal.*	Centaurus	14	74′	54′	16′	686	18,700	33,000	P&W-R2800 2,000 hp ea.	292	325	3,900	3,140	1,380	2,000	30,000	$152,000
	Super-V	4	32′8″	25′	6′5″	178	1,900	3,400	2 Lyc. 0-360 der. to 170 hp ea.	200	210	1,180	970	100	1,450	23,000	$22,500 except airframe
On Mark Engineering Co. *Van Nuys, Cal.*	Marksman	10	71′6″	51′10″	18′6″	541	24,000 25,000	35,000	2 P&W R-2800 2,000-2,500 hp ea.	325 365	425	3,495	3,000	800 1,330	1,200 2,500	25,000	$160,000 to $275,430
Piper Aircraft Corp. *Lock Haven, Pa.*	PA-18 Super Cub 95	2	35′2½″	22′5″	6′9″	178.5	800	1,500	Cont. C90 90 hp	100	112	750	800	18	360	15,750	$6,145
	PA-18 Super Cub 150	2	35′2½″	22′6″	6′9″	178.5	930	1,750	Lyc. 0-320 150 hp	115	120	500	750	36	460	19,000	$7,795
	PA-22 Caribbean 150	4	29′4″	20′7″	8′4″	147.5	1,100	2,000	Lyc. 0-320 150 hp	123	139	NA	NA	36 st. 44 opt.	528 645	15,000	$8,795
	PA-22 Tri-Pacer 160	4	29′4″	20′7″	8′4″	147.5	1,100	2,000	Lyc. 0-320B 160 hp	134	141	NA	NA	36 st. 44 opt.	536 655	16,500	$9,345
	PA-24 Comanche 180	4	36′	24′7″	7′4″	178	1,455	2,550	Lyc. 0-360 180 hp	160	167	NA	NA	50 st. 60 opt.	800 920	18,500	$15,800
	PA-24 Comanche 250	4	36′	24′10″	7′4″	178	1,600	2,800	Lyc. 0-540 250 hp	181	190	NA	NA	60	1,100	20,000	$19,800
	PA-25 Pawnee	2	36′2″	24′	6′9″	183	1,200	2,300	Lyc. 0-320 150 hp	90	100	1,500	930	40	400	10,000	NA
	PA 23-160 Apache "G"	4-5	37′	27′1″	9′6″	204	2,280	3,800	2 Lyc. 0320B 160 hp ea.	173	183	NA	NA	72 st. 108 opt.	853 1,280	20,000	$36,990
	PA 23-250 Aztec	5	37′	27′7″	10′4″	207	2,775	4,800	2 Lyc. 0-540 250 hp ea.	205	215	1,100	1,360	144	1,400	22,500	$49,500
Rawdon Bros. Aircraft, Inc. *Wichita, Kan.*	T-1 (agr)	1	35′	24′4″	7′3″	178	1,400	2,700	Lyc. 0-360 180 hp	132	140	600	600	45	650	16,000	$10,000
Schweizer Aircraft Corp. *Elmira, N. Y.*	2-22C	2	43′	25′9″	9′	NA	450	900	None—Glider	40	90			NONE			on request
	1-23H	1	52′8″	20′10″	7′6″	NA	480	750	None—Glider	88	130			NONE			on request
	1-23H-15	1	49′2″	20′10″	7′6″	NA	474	750	None—Glider	87	130			NONE			on request
	1-26	1	40′	21′3″	7″	NA	348	575	None—Glider	60	104			NONE			on request
L. B. Smith Aircraft Corp. *Miami, Fla.*	Tempo II	12	73′5″	60′3″	20′	569	24,500	35,000	2 P&W R2800 2000-2500 hp ea.	350	405	3,120	3,220	1,180 st. 1,370 opt.	2,400	29,600	$440,000
Stits Aircraft *Riverside, Cal.*	SA 9A Skycoupe	2	28′4″	17′6″	NA	125	900	1,450	Cont. A200-A 100 hp	NA	145	NA	NA	24	500	NA	$4,500
Trans-Florida Aviation, Inc. *Sarasota, Fla.*	Executive Mustang	2	37′	32′4″	13′8″	233	7,100	10,500	Packard-Merlin 1,600 hp	424	457	NA	NA	180	NA	30,000	$32,500
Transland Aircraft Co. *Torrence, Cal.*	Ag-2	2	42′	28′5″	9′8″	321.6	3,468	7,700	P&W R1340 600 hp	130	142	1,220	NA	125	455	17,000	on request

Abbreviations:
Cont.—Continental
Lyc.—Lycoming
P&W—Pratt & Whitney
R.R.—Rolls Royce
opt.—optional
st.—standard
ap.—approximate
eshp—equivalent shaft horsepower
der.—derated
NA—not available

accepted the airplane as an essential instrument for doing business and meeting tightening competition in ever broadening markets. Sure signs that the battle for trade will intensify, hearten the long-range climate for business plane sales.

A closer look at the present activities of the "Big-Three" producers, provides a few hints of new planes and services to come.

Beech Aircraft, at Wichita, shows a marked increase in units produced and in per cent of dollar volume. Commercial sales are $36,350,000 or 40 per cent over the $25,840,000 recorded for the same nine-month period in 1959. In fact, the '60 performance thus far almost matches the '59 annual total. Now, the company's original $50-million sales estimate for this year is expected to be bettered.

Beech expects to deliver more than 1,200 new planes by the end of the year, compared with 800 units shipped last year. The impact of new models on 1961 sales is expected to net a 20 per cent increase for 1961.

The firm also plans to unveil next month its largest and most selective line of business planes in the company's history. Reportedly, Beech will add two new models to its '61 line, thus making a total of nine models of business aircraft, ranging from the single-engine Debonair to the twin-engine Super G18.

Its latest addition to the business airplane fleet, Model 65, Queen Air, powered by two supercharged fuel-injection Lycoming IGS0480–AIA piston engines rated at 340 hp each, is especially adaptable to future turbine power installation.

The new models are reported to include a Continental-powered Twin-Bonanza which will give customers a choice of three types in this series, and a new, powerful and faster version of the light-twin Travel Air.

A jump in horsepower for Continental's IO-470 series, from 250 to 260 hp, is slated for the 1961 Bonanza. This means higher gross-weight limits for takeoff and a larger useful load. A longer fuselage provides more elbow room and space for an optional fifth seat. Interior restyling includes larger windows and a hat rack.

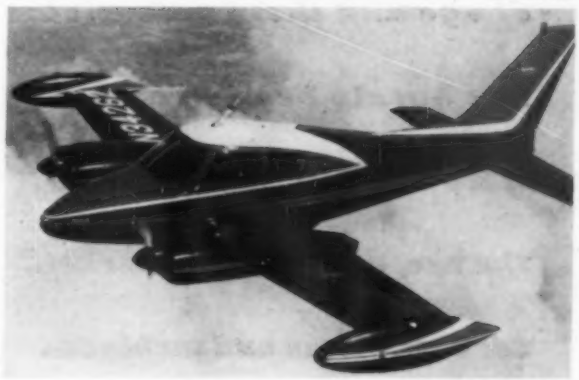
Cessna Aircraft Company also has a better-than-'59 report to offer at this nine-month wrap-up time. Its sales have increased by 30 per cent during the first six months of fiscal '60.

Cessna's commercial sales for the nine-month period ending June 30 were $46,791,000. Cessna's military aircraft sales for the same period were $21,338,000. At the end of May the company had delivered 2,839 aircraft for a 16.6 per cent jump in units shipped. All indications point to a continued percentage gain next year over 1960's heartening developments.

Company president Dwane Wallace reported in FLYING (July) 112 per cent sales jump between 1955 and 1959. Records show a 16 per cent gain annually.

The addition of a four-place light-light twin to Cessna's current and complete line of single-engine and twin-engine models, is expected to raise sales orders for '61 and '62. The new plane, announced recently at a distributor's conference, is said to employ a basic new approach to twin-engine aircraft philosophy. The company says it "will set new patterns of thinking and engineering to meet the challenge of changing times and needs." A prototype of the new twin is due to make its debut early next year. (*Continued on page* 70)

Cessna 175



Cessna 310D

Cessna 210

Lockheed JetStar

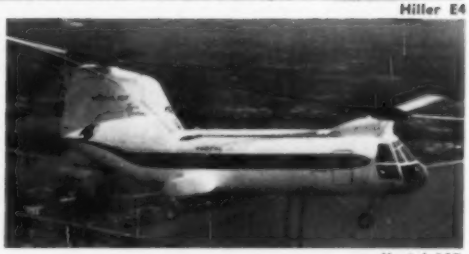
Grumman Gulfstream

Mooney Mark 20A

Helicopters are fast coming of age and their potential has barely been scratched. Here is a factual account of the use, growth, and market for both piston and turbine...

Bell 47J-2 Ranger

Hiller E4



Vertol 107

Brantly B-2

ROTARY-WING AIRCRAFT

By FLYING STAFF

PIPE DREAMS and puff predicted that rotary-wing aircraft could fill the skies with hummingbird traffic but, instead, business and corporate flying has found a vital, vigorous tool, unique in its performance, adaptable in its service and versatile in its operational flexibility.

In its fledgling days immediately after World War II, the helicopter industry suffered from a chronic ailment of modern times: overly active imagination complicated by acute under-performance. Glibly, persons in and out of the industry promised a helicopter in every back yard and a spare one at the hunting lodge. It has taken nearly 20 years for the industry to live down the false picture painted for it.

But, as helicopter operations enter the 1960s they show every sign of maturing. With its growth pattern charted more realistically, the use, the development, and the market of the helicopter industry promises to be tremendous.

Even the most glum crystal-ball gazers admit the potential of the commercial helicopter market has yet to be fathomed fully.

Hughes 269A

Sikorsky S-62

PERSONAL & BUSINESS ROTARY WING AIRCRAFT

MANUFACTURER	Aircraft designation and Model No.	Number of seats	Overall length	Overall height	Rotor diameter	Weight empty (lbs.)	Maximum gross weight (lbs.)	Powerplant (Number, make, model, Rating)	Maximum speed (mph)	Hovering ceiling (IGE)	Fuel capacity (gallons)	Maximum range (miles)	Basic price
Bell Helicopter Co. *Ft. Worth, Tex.*	47G-2 Trooper	3	41'5"	9'4"	35'2"	1,564	2,450	Lyc. VO-435 240 hp der. to 200 hp	100	16,250	42	253	$40,500
	47G-3 Trooper	3	43'7"	9'3"	37'	1,600	2,650	Frank. 6VS 225 hp	105	18,000 (plus)	42	236	$44,500
	47J-2 Ranger	4	43'3"	9'4"	37'2"	1,720	2,850	Lyc. VO-540 305 hp der. to 240 hp	105	16,700	48	340	$72,500
Bensen Aircraft Corp. *Raleigh, N. C.*	*Gyrocopter Model B-8M	1	20'	7'5"	20'	247	700	McCulloch 4318-E 72 hp	85	.....	6	130	$2,995 in kit form $1,660
Brantly Helicopter Corp. *Philadelphia, Pa.*	B-2	2	21'9"	7'	23'9"	980	1,600	Lyc. VO-360 180 hp	100	4,700	31	300	$19,950
Cessna Aircraft Co. *Wichita, Kan.*	CH-1C	2	32'8"	8'5"	35'	2,045	3,000	Cont. FSO 470, 260 hp	124	9,600	NA	260	NA
Doman Helicopters, Inc. *Danbury, Conn.*	Doman-Ambrosini D-10	8	58'1"	10'5"	48'	3,327	5,500	Lyc. ISO-720 der. to 400 hp	104	13,500	119	329 with 10% res	$100,000
Hiller Aircraft Corp. *Palo Alto, Cal.*	**12E	3	27'10"	9'10"	35'5"	1,700	2,750	Lyc. VO-540, 305 hp	96	9,550	46	225	$55,950
	E4	4	29'11"	9'10"	35'5"	1,760	2,750	Lyc. VO-540, 305 hp	96	9,550	46	225	$69,960
Hughes Tool Co., Aircraft Div. *Culver City, Cal.*	269A	2	22'3"	7'11"	25'	867	1,550	Lyc. 0-360, 180 hp	90	6,000	25	200	$22,500
Kellett Aircraft Corp. *Willow Grove, Pa.*	KD-1A Autogiro	2	30'	10'10"	40'	1,500	2,200	Jacobs R755, 225 hp	125	14,000	NA	NA	$25,000 ap.
Omega Aircraft Co. *New Bedford, Mass.*	BS 12-SC Twin	2	36'	13'	39'	3,350	4,750	2 Lyc. 0-540, 260 hp ea.	95	6,200	40	NA	NA
Republic Aviation Corp. *Farmingdale, N. Y.*	Alouette II SE 3130	5	31'10"	9'	33'6"	1,874	3,300	Artouste IIC 480 hp gas turbine	121	9,000	153	375	$103,100
Sikorsky Aircraft Div. **United Aircraft Corp.** *Stratford, Conn.*	S-55	12	62'3"	15'3"	53'	4,950	7,200	P&W R1340, 600 hp	101	2,000	185	400	$170,000
	S-58	20	65'10"	15'11"	56'	7,630	13,000	Wr. R1820, 1,525 hp	123	4,900	198	182	$267,000
	S-61	30	72'5"	16'8"	62'	9,355	18,700	G.E. CT58-110, 1,250 hp	150	9,500	390	265	$650,000
	S-62	12	62'3"	16'	53'	4,550	7,500	G.E. CT58-100, 1,050 eshp	109	15,800	182	260	$273,458
***Umbaugh Aircraft Corp.** *Ocala, Fla.*	*U-18	2	21'	9'9"	35'	1,200	1,800#	Lyc. 0-360, 180 hp	126	15,000	30	350	$9,995
Vertol Div., Boeing Airplane Co. *Morton, Pa.*	107 Model II	25	44'6"	16'10"	50'	10,424	18,450	2 G.E. CT58-110, 1,250 eshp	155	7,800	350	265	$647,280

Abbreviations:
Cont. —Continental
Frank. —Franklin
G.E. —General Electric
Lyc. —Lycoming
P&W —Pratt & Whitney
Wr. —Wright
ap. —approximate
eshp. —equivalent shaft horsepower
der. —derated
NA —not available
* —Not yet certificated
** —The Hiller 12E may be converted to the E4 by the use of a plant-installed kit

Military funds and requirements still wield a heavy hand in commercial helicopter economics. The Army, for instance, has a need for some 1,000 light, turbine-powered liaison helicopters, for which many airframe companies will be bidding. The successful bidder, of course, will be in a position to produce an economically sound commercial version of this rotorcraft.

The industry itself is continually directing its energies and its skills to finding out what jobs helicopters can do for business and is aiming design and development to fulfill these needs.

This key to the growing-up process of rotary-wing aircraft has been expressed by Stanley Hiller Jr. "The helicopter," says Hiller, "is a *specialized tool* for industry. It is not an airplane and cannot be compared with airplane costs of operation any more than planes can be compared to railroad cars. Each of these has its own role to play because they each have different capabilities."

The specialized roles in business and commerce range all the way from pipeline inspection to airline and executive transportation. In between are such varied activities as surveying, herding, utility wire stringing, fire fighting, photography and news coverage.

Latest statistics show that there are 935 helicopters in service by 317 operators. Commercial operators, totaling 193, account for the biggest share with 705 rotorcraft in use.

Executive and company groups have 134 of the rotary-wing aircraft in 94 individual operations. Thirty government agencies use 96 helicopters.

Fitting the aircraft to the specialized need is the progressive trend. In all sizes of helicopters now becoming available, or soon to become available, radical performance break-throughs are occurring. Powerplants and new materials are entering the picture which make possible, in some categories, tripled and quadrupled performance increases between models of a series.

This means, according to Hiller executives, that new markets which never used helicopters before are now finding them feasible. This broadening of the helicopter market is its major source of increased production in the future.

One important milestone was passed last July when

Sikorsky S-60 Flying Crane

Alouette 2-C

Cessna CH-1C

Umbaugh U-18

Gyrodyne XRON-1

Bensen B-8M Gyrocopter

Doman LZ-5

Cessna's CH-1C four-place helicopter became the first to be certificated by FAA for flight under instrument flight rules. The rating climaxed a two-year development and testing program by Cessna to meet special conditions of stability control and handling characteristics required by FAA. This advanced step is expected to hasten the broadening commercial use of helicopters, permitting them to operate in weather minimums equivalent to those for single-engine fixed-wing airplanes of a similar capacity.

Hiller and Bell are the dominating forces in the light two-, three-, and four-place craft, with Sikorsky heading the field of the heavy-duty helicopters along with the Vertol Division of Boeing, an important force in the transport and "work-horse" area.

SIKORSKY AIRCRAFT. Turbine-powered transport and utility rotorcraft are programmed in the Sikorsky plans. Included for construction this year, pending military order, is the twin-turbine S-64 Flying Crane with a payload of eight tons. Also, the all-weather S-61 (the civil version of the Navy's HSS-2), a 25-28 passenger airliner, with twin turbines, will make its first flight before year's end.

Turbine power made its advanced entry into the rotorcraft field last July when Sikorsky's single-engine S-62 became the first turbine-powered helicopter built in the United States to be certified by the FAA for commercial use. First delivery went to Petroleum Helicopters, Inc., of Lafayette, La., to serve off-shore oil rigs in the Gulf of Mexico. This 11-passenger turbocopter with boat hull is expected by Sikorsky to play a big role in oil exploration work as far out as 100 miles in the Gulf.

The S-58, in use by the Navy and Marines, has made its commercial and business debut in the heavy load field. Nearly 1,275 have been produced for military and commercial use, and production is scheduled to continue through 1961.

In its long-range development, three active projects are in the works at Sikorsky: a compound assault helicopter with a gross weight of 35,000 lbs. and a top speed of 250 mph; the S-57, a convertiplane which would combine the high speed of the jet airplane with the versatility of the helicopter; and a four-turbine crane blueprinted to carry a payload of 40 tons.

BELL HELICOPTER CO. 1959 marked the third straight year that commercial sales by Bell topped 100 aircraft. Two piston-driven civil models are marketed: the four-place 47J-2 and the 47G-3 which carries pilot and two passengers. The 47J-2 is the latest in the Bell model 47 series. Three passenger seats are removable to convert the model to a cargo carrier with 57 cubic feet of space.

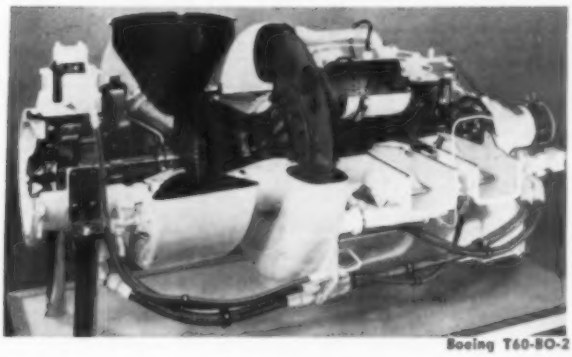
It was Bell's pioneer 47 model which was the world's first helicopter to be certified for commercial use back in 1946.

The HU-1A, a turbine-powered military craft, has not yet produced a civilian counterpart. But the Army production contracts for this model continue through 1961.

Bell is sparking its commercial sales through both finance plans and lease-purchase plans. Financing is placed through Ft. Worth banks with 25 per cent down. A lease arrangement gives customer credit of three-fourths of monthly payment if purchase is made before lease expires. (*Continued on page* 100)

New development programs have tied up millions both in turbine & piston-driven engines. Each has its place in the corporate fleet, and each is here to stay. This is a progress report on . . .

L-19 flies with Boeing 502 turboprop.



Boeing T60-BO-2

POWERPLANTS-
PISTON & TURBINE

By FLYING STAFF

Canadian Pratt & Whitney PT-6

WHEN will small turbine engines begin to penetrate the light aircraft market? When will they invade the application field of two- to eight-place fixed and rotary-wing personal, utility and business market?

Not for at least five years. Not until engine and airframe manufacturers demonstrate convincingly the turbine advantages and the fact that the installed cost of turbines is well within the boundaries of the present market. And, when turbines are available, their place will be alongside (not instead of) the piston engine.

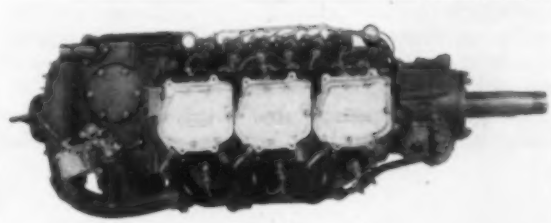
Today's businessman can get an aircraft ideally suited to his personal needs and incorporating aerodynamical design features and new engines which, tied to new communications and support equipment, give him a safety factor never before available.

He may start out with a single-engine two-place aircraft and eventually move into a larger, heavier category, one that will incorporate either a larger single engine, or a multi-engine installation. In line with this continuous pilot-aircraft stepup, plus the accelerating rate of aircraft deliveries, the engine industry has been on a steady development program—one that has tied up millions of dollars in both gas turbine and reciprocating powerplants.

Let's take the turbines first. We know the advantages

Continental IO-470-D

Lycoming IGSO-540



RECIPROCATING ENGINES

MANUFACTURER	Engine designation and Model No.	Number of cylinders	Cylinder arrangement	Propeller drive	Maximum takeoff power Sea level hp and rpm	Normal rated power (hp and rpm)	Altitude for normal rated power	Engine dimension	Displacement cu. in.	Fuel grade	Dry weight (lbs.)
Aircooled Motors, Inc. *Syracuse, N.Y.*	Franklin 6V-335-A-B (Helicopter)	6	HO	Direct	210	3,100	NA	NA		91	295
	6VS-335 Helicopter)	6	HO	Direct	225	NA	NA	NA	NA	NA	NA
Lycoming Division, Avco Manufacturing Corp. *Stratford, Conn.*	O-235-C1	4	HO	Direct	115 @ 2,800	108 @ 2,600	SL	29.56"	233.3	80	237
	O-290-D2	4	HO	Direct	135 @ 2,600	135 @ 2,600	SL	29.56"	289	80/87	264
	O-290-D2B	4	HO	Direct	140 @ 2,800	135 @ 2,600	SL	29.56"	289	80/87	264
	O-320-A1A	4	HO	Direct	150 @ 2,700	150 @ 2,700	SL	29.56"	319.8	80/87	272
	O-320-B1A	4	HO	Direct	160 @ 2,700	160 @ 2,700	SL	29.56"	319.8	91/96	274
	O-340-A1A	4	HO	Direct	170 @ 2,700	170 @ 2,700	SL	29.56"	340.4	91/96	278
	O-360-A1A	4	HO	Direct	180 @ 2,700	180 @ 2,700	SL	29.56"	361	91/96	285
	O-360-C2B	4	HO	Direct	180 @ 2,700	180 @ 2,700	SL	33.37"	361	91/96	289
	VO-360-A1A (Helicopter)	4	HO	Direct	180 @ 2,900	180 @ 2,900	SL	33.37"	361	91/96	298
	O-435-4	6	HO	Direct	255 @ 3,400	245 @ 3,200	SL	38.53"	434	80/87	405
	VO-435-A1D (Helicopter)	6	VO	Direct	260 @ 3,400	250 @ 3,200	SL	34.73"	434	80/87	390
	O-435-6A	6	HO	Direct	255 @ 3,400	245 @ 3,200	SL	34.73"	434	80/87	405
	O-435-23B	6	HO	Direct	255 @ 3,400	245 @ 3,200	SL	34.73"	434	80/87	403
	GO-480-B1A6	6	HO	Geared	270 @ 3,400	260 @ 3,000	SL	38.64"	479.7	80/87	432
	GO-480-B1AD	6	HO	Geared	270 @ 3,400	261 @ 3,000	SL	38.64"	479.7	80/87	432
	GO-480-D1A	6	HO	Geared	275 @ 3,400	265 @ 3,000	SL	40.04"	479.7	80/87	454
	GO-480-G1A6	6	HO	Geared	295 @ 3,400	280 @ 3,000	SL	38.64"	479.7	100/130	439
	GO-480-G1B6	6	HO	Geared	295 @ 3,400	280 @ 3,000	SL	40.04"	479.7	100/130	464
	GO-480-G1D6	6	HO	Geared	295 @ 3,400	280 @ 3,000	SL	38.64"	479.7	100/130	437
	GO-480-G2D6	6	HO	Geared	295 @ 3,400	285 @ 3,100	SL	40.59"	479.7	100/130	442
	IGSO-480-A1A6	6	HO	Geared	340 @ 3,400	320 @ 3,200	11,000	47.56"	479.7	100/130	495
	GSO-480-B1B6	6	HO	Geared	340 @ 3,400	320 @ 3,200	8,000	49.31"	479.7	100/130	498
	O-480-1	6	HO	Direct	340 @ 3,400	320 @ 3,200	8,000	46.22"	479.7	100/130	500
	O-540-A1A5, A2B	6	HO	Direct	250 @ 2,575	250 @ 2,575	SL	37.22"	541.5	91/96	396
	VO-540-A1A (Helicopter)	6	VO	Direct	310 @ 3,300	305 @ 3,200	SL	34.73"	541.5	80/87	435
	O-580-3	8	HO	Direct	400 @ 3,300	350 @ 3,000	6,000	57.64"	578	100/130	610
	SO-580-A1B	8	HO	Direct	400 @ 3,300	350 @ 3,000	6,000	46.67"	578	100/130	574
	VSO-580-A1A (Helicopter)	8	VO	Direct	400 @ 3,300	350 @ 3,000	5,000	49.20"	578	100/130	574
	IO-540-B1A5	6	HO	Direct	290 @ 2,575	290 @ 2,575	SL	39.77"	541.5	100/130	435
	IGSO-540-B1A	6	HO	Geared	380 @ 3,400	360 @ 3,200	10,500	48.5"	541.5	100/130	538
Continental Motors Corp. *Muskegon, Michigan*	A65-8	4	HO	Direct	65 @ 2,300	65 @ 2,300	SL	L-30.41" W-31.5" H-20.31"	171	73	167
	A65-12	4	HO	Direct	65 @ 2,300	NA	SL	NA	171	73	172
	C85-8	4	HO	Direct	85 @ 2,575	85 @ 2,575	SL	NA	188	73	182
	C85-12	4	HO	Direct	85 @ 2,575	85 @ 2,575	SL	NA	188	73	181
	C90-8F	4	HO	Direct	95 @ 2,625	90 @ 2,625	SL	L-23.31" W-31.5" H-29.31	201	80/87	177
	C90-12F & 14F	4	HO	Direct	95 @ 2,625	90 @ 2,625	SL	L-31.25" W-31.5" H-24.18"	201	80/87	186
	O-200A	4	HO	Direct	100 @ 2,750	100 @ 2,750	SL	L-24.18" W-28.53" H-23.18"	201	80/87	190
	O-300-A, B & C	6	HO	Direct	145 @ 2,700	145 @ 2,700	SL	L-39.75" W-31.5" H-23.25"	301	80/87	277
	GO-300-A & C	6	HO	Geared .75:1	175 @ 3,200	175 @ 3,200	SL	L-39.12" W-31.5" H-27.62"	301	80/87	312
	E185-8 & 11	6	HO	Direct	205 @ 2,600	NA	SL	NA	471	80/87	326
	E225-4 & 8	6	HO	Direct	225 @ 2,650	NA	SL	NA	471	80/87	363
	0300-D	6	HO	Direct	145 @ 2,700	145 @ 2,700	SL	NA	301	80/87	267.4
	GO-300-D	6	HO	Geared .75:1	175 @ 3,200	NA	SL	NA	301	80/87	309
	TSIO-470 (Turbo-Supercharged)	6	HO	Direct	260 @ 2,600	NA	NA	NA	471	100/130	465
	O470-B & M	6	HO	Direct	240 @ 2,600	240 @ 2,600	SL	L-43.31" W-33.56" H-19.62"	471	91/96	410
	0470-E	6	HO	Direct	225 @ 2,650	NA	NA	NA	471	80/87	390
	O-470-G	6	HO	Direct	240 @ 2,650	NA	NA	NA	471	91/96	432
	O-470-J	6	HO	Direct	225 @ 2,550	NA	NA	NA	471	80/87	380
	O470-K & L	6	HO	Direct	230 @ 2,600	230 @ 2,600	SL	L-36.03" W-33.56" H-27.75"	471	80/87	404
	O-470-P	6	HO	Direct	240 @ 2,650	NA	NA	NA	471	91/96	432
	IO-470-C	6	HO	Direct	250 @ 2,650	250 @ 2,600	SL	L-37.56" W-33.58" H-26.81"	471	91/96	432
	IO-470-D & F	6	HO	Direct	260 @ 2,625	NA	SL	NA	471	100/130	426
	IO-470-E	6	HO	Direct	260 @ 2,625	NA	NA	NA	471	100/130	428.6
	IO-470-G	6	HO	Direct	250 @ 2,650	NA	NA	NA	471	91/96	429
	IO-470-A	6	HO	Direct	260 @ 2,625	NA	NA	NA	471	100/130	432
	IO-470-J	6	HO	Direct	225 @ 2,650	NA	NA	NA	471	80/87	401.5
	IO-470-K	6	HO	Direct	236 @ 2,650	NA	NA	NA	471	100/130	391
	IO-470-L	6	HO	Direct	260 @ 2,625	NA	NA	NA	471	100/130	429
	IO-470-M	6	HO	Direct	260 @ 2,625	NA	NA	NA	471	100/130	431
	FSO-526-A (Helicopter)	6	HO	Direct	270 @ 3,200	270 @ 3,200 270 @ 3,000	SL 7,900	L-50.33" W-36.64" H-28.54"	526	91/96	560
	GSO-526-A	6	HO	Geared .698:1	340 @ 3,100	340 @ 3,100 340 @ 3,000	SL 14,500	L-51.67" W-34.64" H-28.54"	526	100/130	561

Abbreviations: HO—Horizontal Opposed L—Length W—Width H—Height SL—Sea Level NA—Not Available (*)METO—Maximum Except Takeoff

of a simple engine: ease of maintenance, over-the-weather operation, high power-to-weight ratio and—in the case of the free-shift turbine design—high torque at rotorcraft-hover or low speeds.

Two general types of small jet engines are being studied in the 500- to 1,500-lb. thrust range needed for small, personal-type aircraft. Here is how they compare:

One type follows the general design practice used on the large turbines now in military and airline service. It operates at a high internal temperature and compresses the air entering the engine to a high pressure. Expensive, yes. But the gain would be increased speeds.

GAS-TURBINE ENGINES

MANUFACTURER	Engine designation and Model No.	Type	No. of compressor stages	No. of turbine stages	No. of combustors	Maximum power at sea level	Specific fuel consumption at maximum power	Compression ratio at maximum rpm	Engine dimension	Dry weight (lbs.)	Application
Lycoming Div. Avco Manufacturing Corp. *Stratford, Conn.*	T53-L-1A	Turboshaft (C) FT	6	2	1	860 shp	.735	6	L-47.61"	480	Helicopter
	T53-L-3	Turboprop (C) FT	6	2	1	960 shp	.655	6	L-58.40"	530	Fixed Wing Aircraft
	T53-L-5	Turboshaft (C) FT	6	2	1	960 shp	.664	6	L-47.61"	485	Helicopter
	T53-L-7	Turboprop (C) FT	6	2	1	1,100 shp	.641	NA	L-58.40"	522	Fixed-Wing Aircraft
	T53-L-9	Turboshaft (C) FT	6	2	1	1,100 shp	.652	NA	L-47.61"	485	Helicopter
	T55-L-3	Turboshaft (C) FT	8	3	1	1,990 shp	.641	6.3	L-44.03"	630	Helicopter
	T55-L-5	Turboshaft (C) FT	8	3	1	2,230 shp	.595	6.3	L-45.21"	570	Helicopter
Boeing Airplane Co. *Seattle, Wash.*	502-10S	Turboprop (C)	1	2	2	360 shp	.90	4.47	L-41.5" W-24"	350 (296 mag)	Fixed-Wing Aircraft
	502-10V	Turboshaft (C)	1	2	2	270 shp	1.02	4.4	L-41.5" W-24"	280	Helicopter
	502-10W	Turboprop (C)	1	2	2	325 shp	.89	4.56	L-41.5" W-24"	325 (265 mag)	Fixed-Wing Aircraft
	502-10WA	Turboshaft (C)	1	2	2	285 shp	.93	4.35	L-41.5" W-24"	300 (265 mag)	Helicopter
	520-2	Turboshaft (C)	NA	NA	NA	430 shp	.72	NA	L-57.32" W-25.4"	325	Helicopter
	520-4	Turboprop (C)	1	2	2	475 shp	.71	6.4	L-68.67" W-25.5"	325	Fixed-Wing Aircraft
	520-6	Turboshaft (C)	1	2	2	525 shp	.67	6	L-57.32" W-25.5"	260	Helicopter
	520-8	Turboprop (C)	1	2	2	550 shp	.65	6	L-68.67" W-25.5"	275	Fixed-Wing Aircraft
Continental Aviation and Eng. Corp. *Detroit, Mich.*	CJ69-1025 (J69-T-25)	Turbojet	1	1	1	1,025 lbs/t	1.14	NA	22.3" Dia.	364	Fixed-Wing Aircraft (FAA cert.)
	217-5A	Turboshaft	2	3	1	500 shp	.67	6	19.38" Dia.	210	Final Development
	217-6A	Turboprop	2	3	1	500 shp	.67	6	19.38" Dia.	235	Final Development
	220-5 (Artouste II-C)	Turboshaft	1	2	1	493 shp	.94	3.9	15.9" Dia.	257	Helicopter (FAA cert.)
	141	Turbo-Compressor	1	2	1	191 shp	NA	NA	NA	197	Helicopter
General Electric Co. Small Aircraft Engine Dept. *Lynn, Mass.*	CT58-100	Turboshaft (AF)	10	2—1	1(an)	1,050 shp	.64	8.3	L-55"	280	Helicopter
	CF700-1	Afftan Turbojet	8	2	1	4,000 lbs/t	69	7	L-70" W-33"	585	Fixed-Wing Aircraft
Allison Division General Motors Corp. *Indianapolis, Ind.*	T-63-A-1	Turboprop ET (AF&C)	7+1	2	1	250 shp	.67	6.2	L-39"	110	Fixed-Wing Aircraft
	T63-A-3	Turboshaft FT (AF&C)	7+1	2	1	250 shp	NA	6.2	L-35"	95	Helicopter
Solar Aircraft Corp. *San Diego, Cal.*	Titan T-62-S-2	Turboshaft (C)	1	1	1	65 shp	1.2	3.5	L-25" W-15.5"	52	Helicopter
	Mars T-150	Turboshaft (C)	1	1	1	325 shp	1.1	3.5	L-26.2" W-28.2" H-6.5"	186	Helicopter
Pratt & Whitney Aircraft Div. United Aircraft Corp. *East Hartford, Conn.*	JT-12	Turbojet (AF)	9	2	8	3,000 lbs/t	.9	6.5	L-76" W-21.9"	436	Fixed-Wing Aircraft
Canadian Pratt & Whitney Aircraft Co. Ltd. *Ville Jacques Cartier, Canada*	PT6A-2	Turboprop	4			500 eshp	69	NA	18.45" dia.	250	Fixed-Wing Aircraft

Abbreviations: AF—Axial Flow C—Centrifugal FT—Free Turbine lbs/t—pounds thrust shp—shaft horsepower mag—magnesium an—annular NA—Not Available

The second type of turbine under development would operate at lower internal temperatures and use less expensive materials. Engine parts would be stamped out of relatively cheap metal, reducing cost by eliminating higher-priced alloys and costly machining operations.

Drawbacks? These engines would be less efficient than high-temperature powerplants; they will be heavier and use more fuel. They will be "second-generation" turbojets, available several years after the high-temperature powerplants reach service.

The current turbojet and turboprop aircraft entering the business field are large expensive units intended for fast, airline-type operation—the Lockheed JetStar, the Fairchild F-27, the Grumman Gulfstream, the McDonnell 220, the Convair conversions, the North American Sabreliner. Powerplants would range from 3,000-lb.-thrust pure jets to the 1,500 eshp. turboprops.

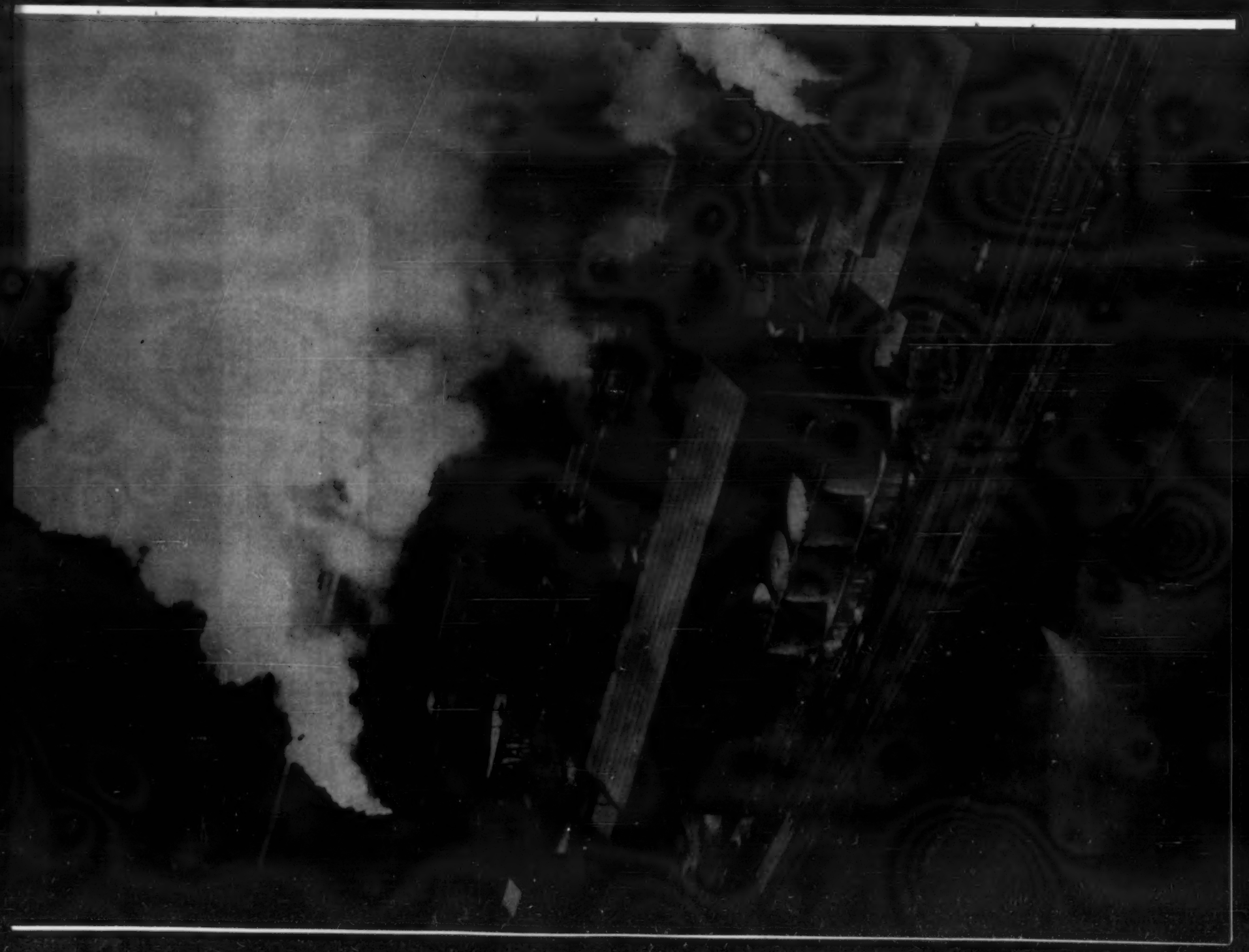
Also entering commercial service are the turbo-powered helicopters—and it has been easier for turbine engines to break into the helicopter market than into the fixed-wing field. Reason? Helicopter operation is more expensive and the increase in performance provided by lightweight turobshaft engines is worth the price of these powerplants to the helicopter owner.

Turboprop engines are satisfactory for short-range aircraft with low block speeds. Their big advantage is in low specific fuel consumption (SFC) as compared with straight jet or turbofan engines, but for long-range aircraft this advantage is offset by the lower speeds.

Turbojet engines are satisfactory for short-range, low-gross-weight aircraft with high block speeds.

Gerhard Neumann, general manager for General Electric's Small Aircraft Engine Dept., told FLYING that "an important consideration with pure jets—such as our CJ610—is that they can be derated to most application requirements. Derated engines give infinite life, an important economy factor. The engine's light weight and smaller size is an important consideration in airframe design, especially in low-gross-weight aircraft."

General Electric's 4,000-lb thrust CF700 turbofan engine is aimed at high block speed aircraft in the 15,000-lb. and above class. Advan- (*Continued on page* 82)



THE AIRMAN'S WORLD

C-A-V-U the world around
but "instruments" to land!

How old the tale of our travail
where smoking chimneys stand

To complicate the E-T-A's
we chart upon the blotter

When homeward bound to kids and wife
—the former farmer's daughter.

Foul trademark of the city's wealth
is smoke to hide the deck

In which, though air en route be fair
the pilot breaks his neck;

For woe to him who thinks that God
alone compiles the weather

Since he will soon be called by all
"our late departed brother."

Yet I remember years gone by when
decks were faultless clean,

When chimneys gaunt with business want
stood smokeless on the scene

And jobless pilots watched the stacks
with longing in their eyes

To see the smoke curl up again upon
the empty skies.

So belch away ye cannoned tubes and
I shall stack my wing

To reach the deck by towered check,
a blip upon a screen,

For we are partners to an end, each
complements the other—

You fabricate the nation's strength and
I hold it together.

GILL ROBB WILSON

The Alouette II, at a gross weight of 3,300 lbs., cruises at 92 kt. and has an "economical" range of 325 naut. mi., endurance of 3.25 hrs.

ALOUETTE II

CHECK PILOT REPORT

A firsthand look at Republic's French-built, turbine-powered utility helicopter—a rotorcraft that holds 9 world records.

By A. C. BASS

Art Bass, FLYING's new contributing editor, is a former Marine Corps pilot rated for both helicopter and fixed-wing aircraft and well grounded in engineering test, aircraft maintenance, and rotary-wing flight instruction. Art, with some 3,000 hours in helicopters, flies regularly as a pilot with New York Airways.

THE helicopter division of Republic Aviation Corp. recently introduced to the American commercial market the new and improved version of its French-built, five-place, utility helicopter—the Alouette—which holds nine of the 28 world record categories for rotorcraft. FLYING, keeping step with the increasing importance of helicopter and VTOL aircraft for business, commercial and private use, flew and evaluated the first of the new Alouette II models to be assembled at Republic's Farmingdale, N. Y., plant.

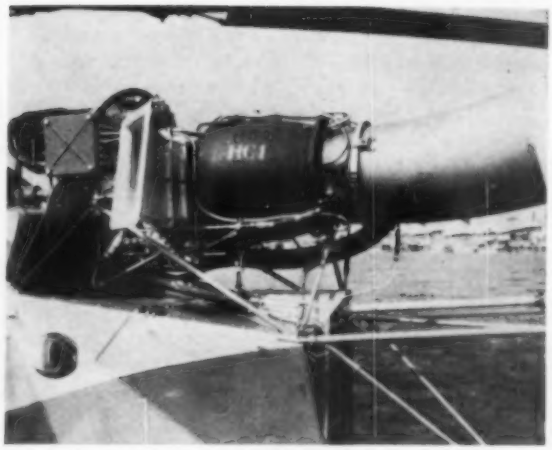
A product of Sud Aviation, the Alouette is a smooth-flying and responsive helicopter, with a markedly low vibration level. It has flown to 36,501.125 feet, for which flight it holds the world's absolute altitude record. It has climbed to this altitude in 35 minutes and one second, another record. It is also the first turbine-powered rotorcraft to be certificated by the FAA (January, 1958).

A utility helicopter capable of varied usage—as a passenger-personnel carrier, as a hauler of cargo, as a crop duster, an aerial surveyor, for air-sea rescue, etc.—the Alouette has a payload range for a pilot and four passengers up to 125 statute miles, and a load factor of 78 per cent of the empty weight.

It also has sparked turbine entry into the airline end of the helicopter business. Ticket offices have been set up at San Diego. As of last June Seattle's regularly scheduled Sea-Tac Airways was operating in the black. And Air Florida Helicopter Airways has taken delivery of its first of two Alouettes which will link five cities, from Tampa to Clearwater.

Basic price of the Alouette is $103,100. At this writing Republic has accepted delivery on 22 aircraft. Twenty have been sold, the company retaining two for demonstration purposes. Republic, with a backlog of five additional orders, expects to sell at least 30 before 1961.

Maintenance is simplified by the open construction which permits easy access to engine and control systems, fuel and oil reservoirs.



New Turbomeca Artouste IIC 480-hp turbine has an overhaul life of 750 hours, more than double that of its IIB, 400-hp predecessor.

Left: The "plush" interior is conventional, attractively finished. Optional is Republic's soundproofing, carpeting and paneling.

The turbine engine is considered the means by which the vast potential of the helicopter will be fully exploited. In its latest version of the Alouette, Republic has incorporated a new 480-hp Turbomeca Artouste IIC turbine in place of the 400-hp Artouste IIB formerly used. Improvements keyed to added power (without increase in maximum gross weight over the earlier Alouette's 3,300 pounds) are significant:

First, the 480-hp powerplant with a 750-hour overhaul life, more than doubles the 350-hour overhaul limit set on its predecessor. Second, the Alouette has improved performance at all flight levels. Third, the warm-weather lift capabilities, always a critical factor with rotorcraft, have been increased by the new engine which runs up to 70 degrees cooler than did the earlier powerplant.

Flight in the Alouette was made from the Farmingdale plant of Republic. Jack Crosthwait, sales engineer, gave FLYING's pilot a rundown on the rotorcraft as it was pre-flighted in the hangar area. Exterior walk-around pointed up the open construction of the fuselage, allowing for easy access to both the engine and control systems, as well as the fuel and oil reservoirs.

Along with the new engines there are several other innovations offered as optional equipment with the Alouette, including a boost-control system, a heater and defroster unit, and an attractively finished, customized interior. In line with the rapid expansion of business aviation, Sud also has an engineering program underway for a twin-turbine model, adding to safety and versatility of the executive rotorcraft transport.

With the Alouette II towed to takeoff area adjacent to Republic's duty runway, we entered the comfortable cockpit—fitted with Republic's optional soundproofing, carpeting and paneling—and got set to rotate. With a full tank of fuel, plus our combined weights, the helicopter grossed out at about 3,200 pounds.

The electric starting system requires no external power and is completely automatic. Sequence is activated by a push button on the instrument panel and, within 70 seconds, we were ready to go. (No warm-up is necessary for turbine engines; the aircraft is ready for flight once maximum rpm (*Continued on page* 95)

"Don't snow me under with propaganda. The plane, not the salesman, does the selling."

HOW TO SELL AN AIRPLANE

The best way to find out is to ask the men who buy them. This composite report is based on 150 personal interviews.

By LOU DAVIS

REAMS AND REAMS of words have been recorded on the subject, "How to sell airplanes to business men." Hangar flying sessions among plane salesmen, company producers, dealers, distributors and just ordinary plane users have spotlighted magic formulae, sure-fire techniques and systems. But, in spite of all of the verbiage and prose, "How to sell airplanes" still remains the single, most talked-about topic of the business plane industry.

Since there has been no dearth of material on the "how to sell planes" angle, FLYING has sought out some answers from the men who do the airplane buying within companies. More than 150 decision-influencing men have been contacted through personal interviews and all have been most frank and helpful. Although they understandably request continued anonymity, their cooperation has been unrestrained.

Here are some humorous, and at times tragic, facts of life as expressed by the men who buy:

The first to reply to this reporter's oft-repeated question of, "How do you like to be sold an airplane?" was a pilot with a very large company. His retort was indicative of a firm determination to be the only plane expert within his company. It, in a sense, answered many of the frustrating questions asked by a perplexed sales manager.

This pilot said very honestly, "I have a wife and five children. Their welfare and mine depends upon my being the airplane expert here. It took me years to 'sell' the boss on airplanes and I'm not about to endanger the project, or my own future, by letting others hound him."

As to the question, "Do you prefer being sold by a pilot or an engineer?" he said, "Let's get one thing straight! No one sells me. I buy! And, I don't care whether he's a pencil pusher or an airplane driver, all I want are the facts about the airplane, its company and, by the time I've checked on all airplanes in the right class, I make the decision."

Further discussion disclosed that this company pilot

preferred a man who would deliver the airplane to him, show him operating procedure and let him fly the plane himself. In his mind the company goes along for the ride to keep him out of trouble—not to "snow me under with a lot of propaganda." He says, "It's the airplane, not the salesman, that actually does the selling."

With but one or two exceptions, all pilots contacted, who had pioneered use of planes within a company, shared these same basic feelings. Their opinions may not have been as direct and personal but they agree that the man in charge of flight operations is the one best qualified to evaluate a plane's fitness to perform a company's mission.

However, in most cases, pilot-buyers do not agree on the kind of sales contact they like. Some like to do their own flight and performance evaluation. A few prefer to deal with pilots only. Others believe teams of pilots, engineers and operating analysts, representing the manufacturer, are valuable. Some want independent surveys where the investment is high. They all agree that the sales approach—whether it involves one man or 10—must be made by men who understand the potential buyer's problem and, in so doing, let the prospect have the information needed to form an opinion.

"Airplanes are just autos or trucks with wings—our business can't afford yachts."

A fleet operation manager said this about salesmen:

HARDLY a day passes that I don't get some kind of a sales pitch from a plane salesman. Some are pilots who take great delight in telling me how tough their plane is; how many Gs it will take; how much punishment it will take on landing; how much faster it is than the competition; that is, until I step into the airplane. Then all I get is excuses or instructions to watch this or that limit. But when *they* have the wheel no holds are barred.

"Believe me," he continued, "no one feels more compassion for the plane salesman than I do, especially if he's a pretty good pilot and not much of a salesman. I hate to ride with other pilots myself but if I had to ride along with another pilot—one who is green about my plane—and do nothing while he abused a $700,000 or $1,000,000 item, I'd get ulcers too. Nevertheless, this is the place where real salesmen shine and show their talents. Good ones let you fly, are as calm as bookmakers or bankers, and in a very subtle way make you feel as though you're the best pilot in the world."

Obviously, the company flight chief is an individualist. If he has pioneered the service within a company, he's likely to be very proud and very sensitive about his position and department. The slightest suggestion about talking to the company president or the board of directors will meet opposition.

THE second generation managements of flight operations supervisors interviewed are more charitable toward sales pilots and teams. They do not seem as prone to guard or protect the front office from "plane peddlers" as much as the pioneer company pilot. They welcome closer relationship and frequently are enthusiastic about having company management briefed on each airplane and its qualifications. There seems to be a sincere desire to "educate" the company.

Of the 10 top company management men interviewed, the comments of one president suffice for all. He is a man who flies thousands of miles per year in company planes. He looks upon the airplane as an essential business tool. However, he is "gun shy" about appearances, especially where stockholders are concerned, and for this reason he does not wish to be identified. His views are as follows:

"Most aircraft salesmen I have met spend too much time extolling the magic of airplanes or romancing flying. They talk speed and time in very unrealistic terms. As business men using business planes, I think our company is more concerned about reliability, safety, passenger comfort and realistic costs for our type of usage. Buildup of plane size, plush interiors and flashy decorations tend to scare me off. I suppose that's because airplanes are nothing more than autos or trucks with wings—our business can't afford showboats or yachts."

In every instance, the presidents rely almost entirely upon company flight operations management to evaluate equipment suitability. They come in on financing, equity and overall budget aspects of new plane buying. It was here that three men expressed interest in briefings by sales teams, in "having a chance to talk with cost experts." (*Continued on page* 108)

"They talk speed and time in unrealistic terms."

1

2

4

3

All in a day's work: 1—Bob Porter, chief pilot for Shell Oil, prepares for trip in DH Dove, one of 26 Shell-owned planes; 2—With co-pilot-mechanic Bill Sherrill, Porter plans the flight; 3—Both men preflight the airplane; 4—Set to go, Porter welcomes his passengers. He logs 400 hours a year, much of it checking out the company's 85 pilots and flying mechanics.

The fast-growing field of business flying is generating careers for the executive pilots. What are the job requirements? Pay? Your own chances?

THE TYPICAL BUSINESS PILOT

By JAMES H. WINCHESTER

Ex-Navy instructor and transport-veteran Porter—with 8,000 hours in the cockpit—typifies today's corporation pilot.

AS CHIEF PILOT for Shell Oil Company, with over 85 captains, copilots and flying mechanics, and 55 single- and multi-engine land and seaplanes, including 14 helicopters—not one of which, incidentally, is a so-called "executive" aircraft—tall, lanky, able Robert "Bob" Porter, a 42-year-old former U. S. Navy instructor and transport pilot, is one of the nation's top corporation flyer-executives.

"These days," Porter stresses, when talking about his job, "there is too often a tendency to lose sight of the working role that aviation plays in modern business—too great, and too often, a disposition to view corporate planes as a luxury "fringe," for the benefit of just the big brass.

"Here at Shell—and our fleet, both those owned by Shell Aviation and those we use under long-term lease or rental agreements, consists of 12 different kinds of planes—we view our aircraft as production and marketing tools which must earn their keep. The real value of a business aircraft is determined not by its cost, but by the company's ability to use it profitably.

"When I first joined Shell eight years ago, coming from the now defunct Midwest Airlines, of Omaha, where I was a captain as well as being in charge of maintenance, I was among the first full-time employee-pilots for the company's production division."

Shell, at the time, had several salesmen who doubled as pilots, flying small, single-engined company-owned planes on marketing trips, and the company's separate pipeline division had been using single-engine Luscombes for several years on pipeline patrol in the southwest U. S.

But with the hiring of Porter at Casper, Wyo. as its first full-time pilot, and with a deHavilland Dove as its first production-division plane, Shell jumped feet first into the business-flying picture, firmly convinced that aircraft would play an increasingly larger role in their operations on all levels. One way in which this has been demonstrated, reports Porter, who has been the company's chief pilot since 1954, with offices now in Shell's Radio City headquarters in New York City, is demonstrated by the fact that the company's exploration parties in Alaska, five years ago, switched from horses to helicopters because they were not only more efficient, but were cheaper to operate.

"There are times, though," says Porter, "when we find it cheaper to use commercial airlines. Although I average 300-400 hours a year in all of our various type planes —checking out our pilots, mostly—I actually travel, in the course of my work, more miles on commercial airliners than I do in company-operated planes."

As chief pilot, it's Porter's job—he has a total of more than 8,000 hours in single- and multi-engine aircraft—to establish the overall policy for Shell's company-operated planes, hire the crews, supervise the maintenance, initiate and effect procedures for training and maintaining pilot proficiency, set up operational procedures, recommend purchases, changes, or retirement of aircraft and equipment, carry out periodic flight checks on each pilot, prepare preliminary budgets and recommendations for flying activities, act as pilot when necessary or requested and, flying a desk, keep up with the paper work of endless variety.

One of the nation's largest agencies placing pilots with business concerns—such as (*Continued on page* 86)

A NATIONAL SURVEY ON:

Aircraft purchase loans today are readily available—if your credit is good. What kinds of loans exist? Whom do you see? A complex situation clarified.

ESTIMATES BY TOP AUTHORITIES indicate that 70 to 90 per cent of all aircraft sold today are financed in some measure by banks, finance companies, leasing companies or credit unions. After spending a month interviewing bank and finance company officials, aircraft manufacturers, dealers and distributors throughout the nation, I certainly can agree with this estimate. If anything, it's conservative.

It is not the intent of this report to analyze the buying and selling of money in the aircraft sales market as a barometer of the air world's economic status, beyond the bare statement that apparently aircraft purchases have achieved, in the eyes of financial institutions, approximately equal loan status with machine tools, plant expansion, housing and refrigerators. This, in spite of comparatively very low unit volume: 7,689 new planes delivered last year by all general aviation manufacturers combined.

By no means should such a statement be taken to indicate that all financial institutions take aircraft paper. Very few, however, would turn down the request of a good customer with a respectable line of credit. And there is hardly a city in the nation without at least one bank which, if not actively soliciting aircraft paper, at least seldom refuses it.

I found not a single bank official who would give a flat "No" to the question: "Are you interested in aircraft loans?" Many stated they had no previous experience in the field but were actively studying it. One very conservative eastern bank which restricts its aircraft loans to its regular customers felt it should know more about the subject and was encouraging its installment loan men to learn to fly. Results: three have licenses, two have planes, and dealers in the area are highly satisfied with the bank's service.

An equally conservative midwestern bank had no experience in the general aviation line, due primarily to the bank traditionally not having been in the retail financing field. But they quite evidently had a weather eye cocked to the large, corporate plane market and were already in on airline equipment loans.

Across the street, a less conservative but equally large bank and one very much involved in the retail loan market, including a large slice of the city's private and business aircraft purchases, gave some forthright answers to my questions. When I showed surprise that the bank did not have an aviation expert in its loan department, one official informed me: "If a man were to walk in here now and ask to borrow $100 to buy a dead horse, we'd loan it to him—*if* his credit was good. If he then came in and asked what he should do with the dead horse, we'd just tell him that was his problem." The point, of course, is that the bank (this one, not all of them) does not look to the airplane being purchased as security for its loan, but rather to the borrower's credit rating.

And there is the crux of the present situation which finds plenty of loan money available for aircraft purchase at usual installment loan rates—*if* the borrower's credit is good.

As many an aircraft owner can testify, it was not always so. Banks and finance companies, I am assured by those who know, get into and out of specific fields with great rapidity. Highly individualistic, there are not always ways of generalizing their reasons for blowing

Financing your airplane

By CECILE HAMILTON

hot and cold on a particular loan area. In aviation's case, several reasons are obvious.

After the second world war, many jumped into the aircraft loan market, anticipating a boom of a-plane-in-every-backyard proportions. Instead they found themselves loaning money to youngsters fresh out of the G. I. Bill training program with little ability to pay for the surplus war planes they were buying. And the planes themselves were soon worthless junk, too costly to operate and too often in need of replacement parts no longer in stock. Badly singed, many banks got out of the market as best they could, determined never to enter it again.

But many are coming back, for today's aircraft market is a horse of another color, and dead it is not.

Probably the most important reason for the market's rejuvenation has been the business aircraft fleet's stabilizing influence, putting a sound economic foundation—certainly a very good line of credit—on the buyer's side of the ledger.

Before this happened, however, several aircraft distributors formed their own finance companies when they were unable to get banks to take the paper. A case in point was Mel Walston, president of Walston Aircraft Sales & Service, Inc., for many years one of the largest Cessna distributors. Located across the river from St. Louis at Civic Memorial Airport in East Alton, Ill., Walston had tried for years to interest local banks in his sales. Eventually he organized Aircraft Finance, Inc. at Springfield, Ill., with a number of branch offices to serve his customers. Continuing his campaign on the banks, he finally interested one in a neighboring community, Granite City.

Today, the Granite City Trust and Savings Bank is very much in the aircraft finance picture.

Highly satisfied with their new loan area, the Granite City group has carried the word to other banks. One in particular, suburban Chicago's Beverly Bank, has made some almost spectacular inroads not only on aircraft financing but also on aircraft sales. Curious as to the potential of this new field, Beverly sent its installment loan vice-president, Wes Larsen, on an exhaustively thorough tour of the nation's aircraft manufacturers, dealers and distributors, banks, and finance companies experienced in the subject. Results: two years ago Beverly entered the aircraft finance field, today carries $4,500,000 in aircraft paper on a national basis.

An interesting angle here is the fact that Larsen, a former Navy transport pilot and currently checked out in practically all models of general aviation aircraft, is able to combine his extensive aviation knowledge with his loan experience to offer customers an aviation advisory service.

His "clinics" as he calls this service have become widely known not only among Chicago business concerns but throughout the business world. His advice as to type of equipment and financing methods has been invaluable in many instances.

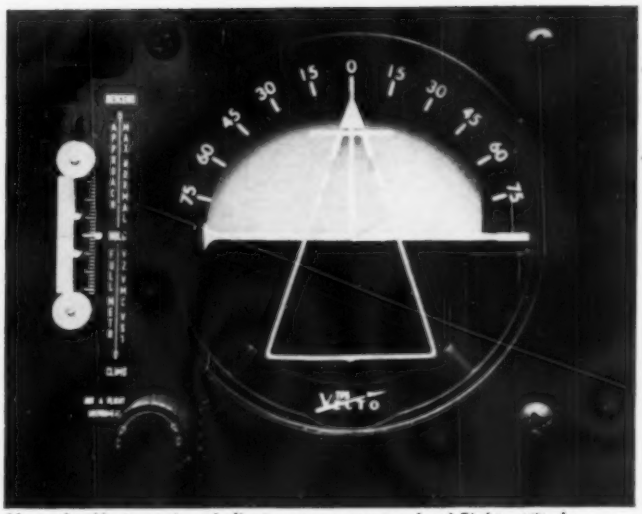
Larsen's aggressive program seems to have raised some eyebrows in the tradition-bound world of financing. During the course of my many interviews, I came across a number of former General Motors Acceptance Corporation men now in the aircraft field. Long accustomed to the tradition that financing is never solicited, merely offered as available, they find it hard to believe that Larsen aids aircraft dealers by often going with them, in effect, to close a sale.

However, many dealers have found this service extremely valuable not only to themselves but to their customers. A dealer often can sell a customer an airplane but finds today's complicated accounting methods upon which so much of American purchasing is based somewhat beyond his ability to discuss. Larsen, coming into the sale at that point, is able to advise the customer how to secure the best tax advantage, conserve his cash reserve, and receive the most favorable depreciation in relation to the customer's (*Continued on page* 101)

Jerry Schlaeger holds an FAA airline transport rating, with commercial privileges for land and sea, single and multi-engine, and helicopter. He is a USAF command pilot, with green instrument card.

Schlaeger, a flight and instrument pilot instructor, was director of the Randolph AFB, Tex., instrument flying school. He also was director of the Mitchel AFB, N. Y., instrument flying school.

He is a graduate of USAF's helicopter and amphibian pilot schools, and of the Aviation Safety School at the University of Southern California.



Here the Vecto system indicates an on-course, level-flight attitude.

EVALUATION OF THE Vecto FLIGHT SYSTEM

THE VECTO FLIGHT SYSTEM—based on the concept of a one-instrument application to provide speed, direction and flight angles in all flight conditions—presents a new face to the familiar and faithful artificial horizon. It is a concept, reported in this FLYING pilot evaluation, which gives a brand new approach to attitude instrument flying.

For some time we have been setting the miniature airplane of the artificial horizon before takeoff and again after reaching cruising altitude. After that we let it alone to establish a relationship between it and the nose of the actual airplane to the natural horizon. If the miniature airplane appeared low on the horizon bar, then the nose of the airplane was low and we were diving; if the little airplane was above the horizon bar then the nose of the aircraft had a similar relation to the natural horizon. All pitch changes were made from this set position.

In most conditions of flight, the changes occur with the miniature airplane either on or quite close to the horizon bar. This is usually the case when an ILS or GCA is flown. In some conditions, however, such as climb-out after takeoff, the pitch attitude can be quite steep with the miniature airplane well above the horizon bar. Precise changes can be difficult. When engine failure occurs at such a critical point, confusion, vertigo and panic sometime results.

Not so with Vecto. It aims at precluding such a chain of events by its simplified presentation and operation.

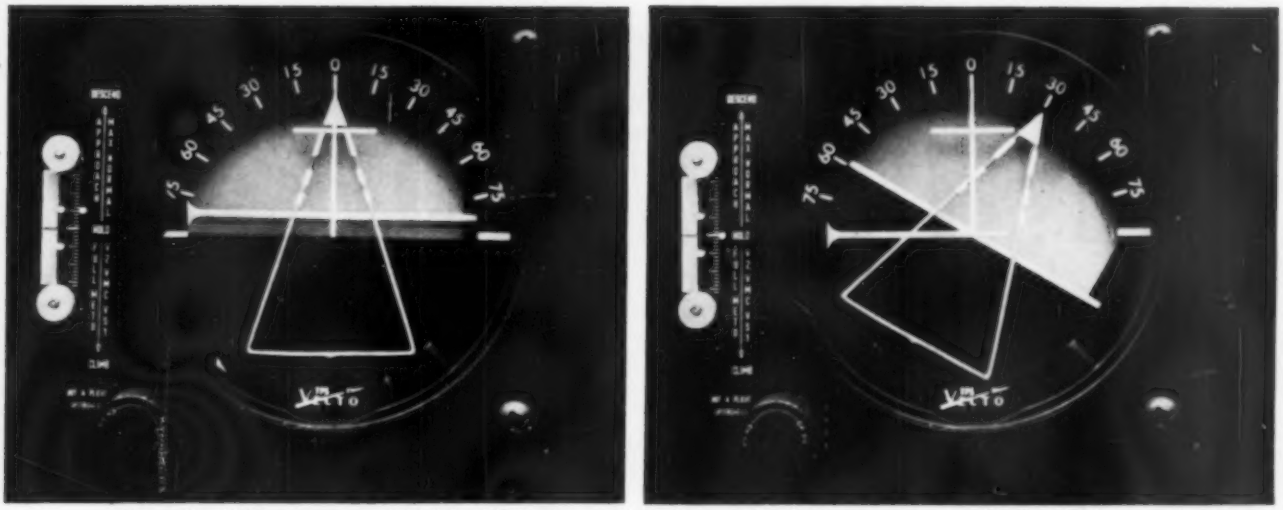
The Vecto Flight System is a precision artificial horizon which can be calibrated to the various performances and flight configurations of any given airplane. A standard horizon, electric, vacuum, or even one from an autopilot system, is remanufactured and modified. The remanufacturing, according to Lane Hartwell, Vecto's vice-president, is necessary to reduce tolerances and precision errors to an absolute minimum. The modification, of course, is to provide the Vecto presentation.

The instrument is manufactured at Vecto's Houston, Tex., facilities. Fremont W. Burger, president, also heads Transport Flight Systems, Inc., at Houston's International Airport, which offers corporate and transport training and instrumentation, including the use of the Vecto System.

Cost of the electric system is $1,765 outright, or $1,515 on an exchange basis. For the vacuum system, price runs from $1,415 outright to $1,265 for an exchange. Autopilot system ranges from $1,765 outright purchase to $1,515 for an exchange. To date, according to Hartwell, nearly 300 Vecto systems have been installed in varied private and executive aircraft, including Commanders, Lodestars, Marksmans and Tempo IIs.

During the modification process the miniature airplane and its pedestal are removed. The upper part of the background is tinted off-white, the lower part remains flat-black. The banking index at the top of the horizon is expanded into a large pylon which demands to be seen. If you don't have level wings now, it isn't the instrument's fault. An elongated cross is imprinted on the glass face at the top to simulate an airplane at the center of the pylon when the wings are level. The horizon bar remains unaltered.

The miniature airplane has been replaced by an externally mounted reference bar which extends three-fourths of the way across the face of the horizon and attaching to a computer which is mounted left of the instrument. Paralax error present in all flight indicators would be accentuated here, particularly when pilots of



Descending flight, on course, and *(right)* a left, level turn with 30 degrees of bank. Computer is mounted to the left of the gyro horizon.

By GERALD J. SCHLAEGER

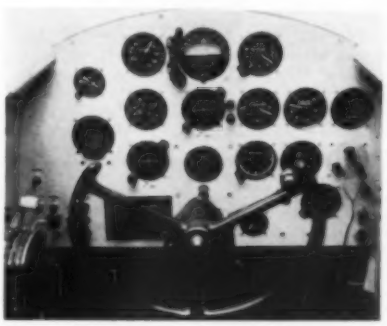
New flight director combines speed, directional, and climb angle control.

different stature (the short and the tall) fly the airplane.

It is the computer which permits accurate calibrations to the various flight segments. The calibration scale is vertical, one inch in length, and is divided into 32 equal increments. On the left side are two fixed but adjustable white index dots which may be set by loosening a finger nut, moving to the desired position and retightening; thus, locking it into place. The upper index is for the approach, descent or cruise segments. The lower one is for climb or V_2 segment (minimum takeoff safety speed, one engine inoperative).

To the right of the calibration scale is a single white index dot which is connected to the reference bar and is adjustable at any time by use of the adjusting knob below it.

To properly use the Vecto System, considerable indoctrination is necessary. Proper use requires the reference bar be adjusted to each new segment of flight and in most cases before that segment's attitude is established.



Vecto indoctrination is also via flight procedure trainer. System is mounted top-center on panel.

This means the computer must be calibrated to each aircraft before proper relations and setting can be made. Normally V_2 attitude is calibrated into the lower left index dot and approach or descent attitude is calibrated into the upper left index. Other attitudes are learned, and set with reference to the scale. This permits the reference bar to be set to an exact position at any time.

By placing the horizon bar under the reference marker the respective attitude then will be established with a minimum of effort and thought. The V_2 attitude set into the computer, according to Hartwell, is based on the manufacturer's gross weight limitation and, once set, remains fixed. The setting is accomplished by making a flight test.

It would appear to the writer that the V_2 attitude would increase as the gross weight decreases and would actually decrease under warm, humid flight conditions. This, of course, would call for the use of pilot judgment and techniques if the aircraft failed to respond properly. During the tests no such difficulties occurred, although the airplane appeared to reach a state of strain when reference bar index is placed in the high-drag condition rather than at zero thrust. We definitely ran out of rudder in this particular instance, a slow turn was apparent and aileron was required to stop turn. The Vecto System recommends that single-engine directional control be maintained by rudder only and in a wing-level position.

To properly perform a takeoff the reference bar index is placed in the V_2 position, that is, directly opposite the lower, fixed, white index dot. The usual pre-takeoff checks are accomplished. After aligning with the runway the power is advanced to "takeoff." As the airspeed reaches V_2, the aircraft is rotated to V_2 attitude, i.e., placing the horizon bar directly under the reference marker. When airborne both the landing gear and flaps are retracted.

If an engine failure should (*Continued on page* 120)

PART IV

CONVAIR

DESIGN of a successor to the DC-3-Lodestar category of civil transports was a clamorous post-war challenge for the aircraft industry.

World airline markets could absorb upward of 2,000 units of the right plane, a twin-engined craft of doubled performance and halved operational costs.

Major airlines of the United States were interested primarily in long-haul business, nonstop transcontinental travel and transocean flight to everywhere. Douglas, Lockheed and Boeing were competitively locked into that market with the DC-6, Constellation and Stratocruiser. The lines, however, could not brush off grass-roots customers. They needed an intermediate transport as modern in its utility as were the long legged four-engined types. Foreign airlines needed the same.

Why then did not every airframe builder leap at such an opportunity?

Two of them did—Martin and Convair; and lived to rue the day! Martin waded into such troubled economic waters that ultimately the very nature of the company was reoriented. The effect at Convair was gallons of red ink and change in corporate control.

That both aircraft involved, the Martin 202 and 404 and the Convair 240-440 series, ultimately came to be "work horses" of the airways and worthy successors of the DC-3-Lodestar types did not lessen the headaches they generated on the way to their final success.

What possibly could happen in the evolution of two intermediate transports to shake the very foundations of the distinguished companies which sponsored them?

The answer: fantastically swollen cost of development and production which, in the case of civil aircraft, comes from company funds, and several rare miscalculations. Where airplanes were once unforgiving of pilots they now picked on engineers.

XF-92A pioneered worldwide trend to delta wings.

As a matter of record, the Congressional Aviation Policy Board, to which several of us were advisors, flatly stated in its report of 1947, "Cost of design and prototype development of civil transports is so high that neither the manufacturers nor the air carriers can today afford to invest the sums involved."

Since the civil transport fleet is a logistic reserve of air defense, some arrangement of government credit constructively might be extended for prototypes judged to be of national import. It is not in the national interest that either manufacturers or airlines be forced into economic jeopardy to maintain progress in modern vehicles.

Before industry proceeds toward multiple-Mach transports—as inevitable as the rising sun, even although a decade of time and a dozen billions of dollars may be involved—Senator Mike Monroney's committee might ponder well this problem. If small prototypes can threaten airframe builders of great stature, what might a supersonic airliner prototype do? Heaven knows, the subsonic types have done enough already, and lucky indeed they are in respect to foreign competition.

Convair's decision to proceed with an intermediate transport had several facets of motivation.

One was a logical desire to share in the civil market. Another was Convair's excess-profits position involving an approximate

All-weather F-106B, two-place transition version of the Delta Dart.

B-58 with disposable pod. Low-level missions also are planned.

Highlights of the post-war era include the delta-wing fighter and bomber, jet airliners, the Atlas ICBM and other missiles.

INDUSTRIAL GIANT OF THE AIR AGE

By GILL ROBB WILSON

$25,000,000. A third was the competitive situation in the intermediate transport category. And, of course, there was the ever pressing need to hold together the hard core of engineering and management talent in some kind of promising project. The company could afford to take on a temporarily unprofitable enterprise to accomplish this purpose, especially in view of its excess-profits situation.

IT MAY be asked why Convair did not parlay the C-87 transport version of the B-24 into a civil carrier and thus enter the airline market at the level where the momentum was greatest. Had not the C-87 already filled a critical gap in military transport? True. I think, however, Convair decided wisely against the idea. The C-87 just did not have civil potential. How that son of a gun could fishtail on automatic pilot in weather!

Hitchhiking from Cornwall, England, to Casablanca, I once found myself in the last bucket seat of a C-87. The going was rough. In the midst of it, the captain called back for me to come forward and change seats for a while with the copilot. I assured him, "I'm doing all right here. Just give me time and I'll get as sick as anybody."

What did Convair encounter that made a headache of the intermediate transport?

Well, for one thing, engineering and tooling costs swiftly soared to about $13 millions. Martin, first in the field with its project, provided stiff sales competition. To overcome this, Convair priced its aircraft too low—actually under $200,000 on one big order. Additionally, the company catered too broadly to individual airline detail "specs." Such things as a crippling 100-day strike, certain CAA redesign requirements, material procurement problems and enormously increased paper work added to the misery. Where management had calculated 30,000 man-hours of labor per plane, the actual figure proved to be 68,000 hours for the first production run of several hundred planes. Nor was the aircraft ready for service as soon as forecast.

By 1956, ten years after the anniversary prototype Model 110, the "Convair" would be in use around the world on more than 40 airlines and in numbers beyond a thousand. It would have proved to be one of the most dependable and economical aircraft ever to carry a passenger. But in 1947, Convair had spent more than $32,000,000 on the ship—almost $17,000,000 above the excess-profits tax adjustment—and was in real trouble.

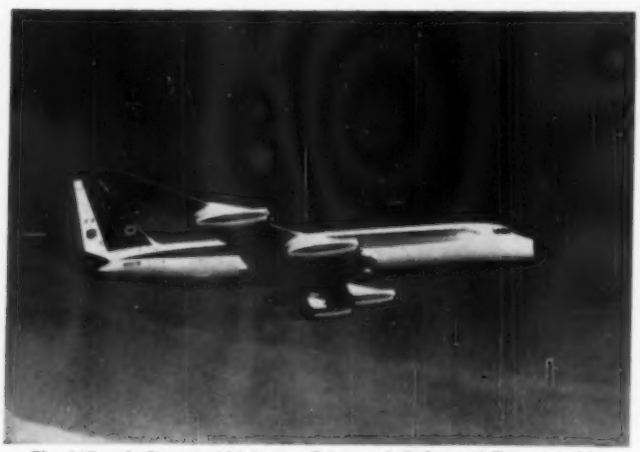
It was at this time that the Odlum interests stepped into the picture with refinancing and by 1949, by virtue of the good reputation the Convair was establishing in service, sales began to mount. From that time forward, it was a profitable "shelf item" for the company. Adapted as a staff transport, a navigational trainer and an evacuation ambulance by the military establishment, it also achieved a notable place for itself in the logistics of defense.

Meanwhile, what of the B-36, Convair's mammoth six-engined "pusher," the strategic global bomber upon whose retaliatory power American security was to rest?

AS WE noted in the preceding article of this series, the B-36 first flew on August 8, 1946 from Carswell Air Force Base, two years later than it's original ETO, due to low priority and the awaited development of its P&W powerplants, the 3,000-hp R—4360 Wasp Major.

Probably no more controversial aircraft ever took to the sky. Its ability was condemned; its function questioned; its integrity attacked. Produced during years of shrinking defense budgets, it stepped on sensitive toes in every direction—defense concept, inter-service ambitions, inter-industry competition. It stalemated immediate building of Navy's super aircraft carriers; caused cancellation of Boeing's B-50 program, Northrop's B-49 "Flying Wing" and North American's intermediate jet bomber, the B-45. It vitally affected Air Force internal organization; set up Strategic Air Command as the long arm of the Monroe Doctrine; eased imperative necessity of U. S. foreign air bases; and gave the atom bomb added weight.

We might observe in retrospect that the B-36 fulfilled its destiny primarily because it lent itself to successive modifications which added more than 100 mph to its speed, 10,000 feet to its service ceiling and



The 615-mph Convair 880 is now flying with Delta and Trans World.

Convair 600 makes its initial appearance with American in 1961.

above 50 tons to its all-up weight, over the years of its production schedule—August, 1946 to August, 1954. During that time Convair turned out approximately 360 units in various versions.

When first projected, a gross weight of 278,000 lbs., ceiling of 35,000 ft., speed of 335 mph and range of 9,000 miles with a bomb load of 10,000 lbs. seemed ambitious. By 1949, four jet pods had been slung beneath the wings and the B-36D prototype clocked 435 mph at its service ceiling above 45,000 feet. Even these figures were to be exceeded as the "F" model got the new Dash 53, R-4360 engines rated at 3,800 hp each. The "J" model in 1953 was lifting 400,000 lbs. gross, and the recon version was cruising well above 50,000 ft.

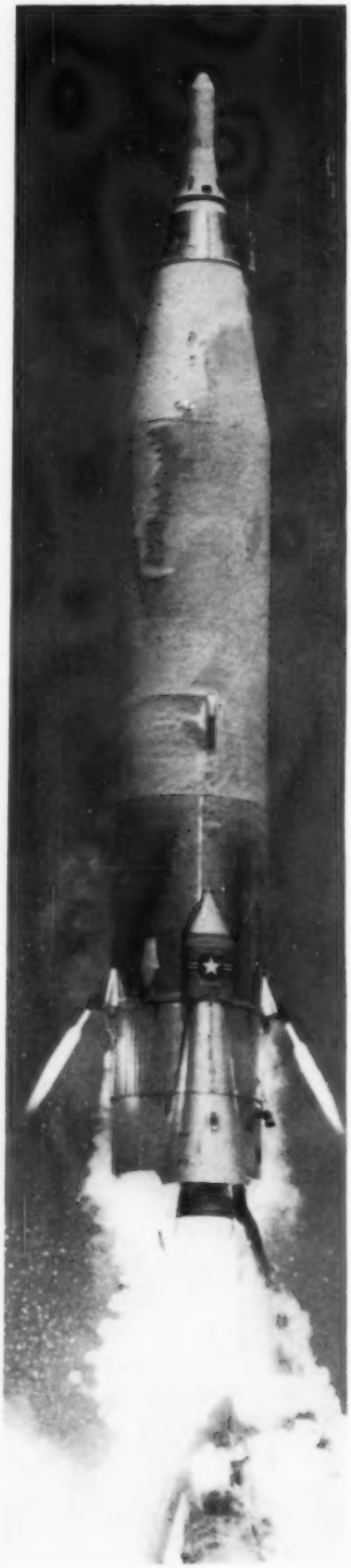
In short, the B-36 grew with the requirements of its military mission and avoided obsolescence until its role could be taken over by the oncoming turbine-powered retaliators. Whatever, in effect, anyone else thought of the B-36 becomes incidental beside the fact that it was respected decisively by the one evaluator who counted—Stalin. God grant equal role to all Free-World weapons!

WE WILL not tax reader patience with details of the pusher planform, empennage modification, vibration problems of the great 19-foot props, hydraulic and electrical system complications, and so on. Even air base dispersal of the giant, and time for preflighting required rethinking. Suffice that the B-36 survived its operational "bugs," acquired the deep loyalty of its crews and held the line of transition from one era of airpower to another. And that was some holding for within that span of time the Berlin blockade, the Greek civil war, the Kremlin's pressure on Turkey, and kindred aggressor moves found Stalin backing down rather than risk atomic saturation by the B-36.

ON establishment of the operational B-36 group at Carswell, Maj. Gen. Roger M. Ramey, then commanding the 8th Air Force, had invited me to visit him at his bachelor quarters in a small house just off the end of the runway. He rightly thought I would be interested in the crew training, mission briefings, and other details of indoctrinations.

One night around 2 a.m. the phone awakened us – nothing unusual – but this time it was the Officer of the Day calling to say that the field was socked in and that a B-17 from the west coast, low on gas, and with General Hoyt Vandenberg and Air Marshall Tedder of the Royal Air Force aboard, had to come in. General Ramey would want to meet the party, of course, but the O. D. also was worried about the dense fog. Could the general come down to the flight line ahead of time?

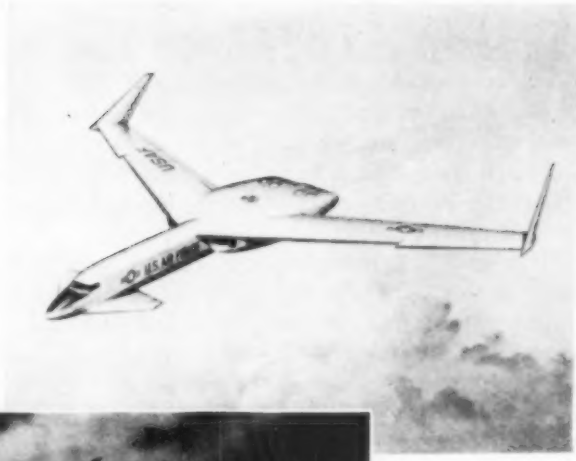
We groped our way to the field. Visibility was exactly zero. Worry became SOP for all of us and we could imagine even more so among the people in that



Right: Salvo launching of Convair's Terrier, a radar beam-riding surface-to-air missile. A solid-fuel rocket, it is used on shipboard and for beachhead attack.

Right: The Atlas 56-D ICBM rising from its pad at Cape Canaveral. The Convair-built missile flew 9,000 miles, landed in Indian Ocean.

Left: This deck-level launch of the Convair Tartar dramatizes its use as a surface-to-air missile, intended for destroyers, cruiser secondary batteries.



Right: One of several versions of a nuclear-powered aircraft under design by Convair for the Air Force. The indirect-cycle engines would mount at tail.

Left: In this version of atomic-powered airplane, two conventional jet engines under the wing complement direct-air-cycle nuclear powerplants at rear.

B-17 working out its approach. Finally, we heard the engines throttled shut and eventually the dull rumble of the landing. Jeeps were sent out to guide in the B-17. When the props had been stopped, we rushed up to open the door and welcome the presumably uneasy "brass" to the safety of terra firma. Nobody came out so we climbed in. They were playing bridge! Our anxiety had been love's labor lost, but in the interest of more and better sleep for air base personnel we suggested lending a B-36 to the Chief of Staff.

No good purpose can be served here in conducting the reader through the Pentagon and Congressional hassels of the so-called "B-36 trials." They originated in heat and generated more smoke than light; and have no significance today except as another fragment of testimony for service unification.

ONE added observation of B-36 uitilization may, however, be of interest. In 1951, Convair was authorized to build an experimental test vehicle, the NB-36H, conventionally powered, but carrying a nuclear reactor aft in the great fuselage. Thus, in the waning days of piston power, the big bomber was commissioned to leapfrog the coming era of turbine power and probe toward a still far-distant source of unlimited range propulsion.

And now our tale of Convair departs from the old era of design and power, an era which had lasted 40 years, from the Wright gliders to 10-engined bombers.

Scientists, engineers, strategists, if not politicians, realized that rather than being matured, airpower was in its mere infancy. All that had gone before was prelude, the B-36 no less than the Wright "B" Flyer.

In so far as Convair is concerned, we will conclude our reminiscence of the industrial giant with comment on two especial contributions to the new era—the delta wing and the missile.

LIKE so much that has evolved in technology, both these concepts had root in German science—the missiles being best remembered because they had been sensational in WW II but the strangely planformed jets no less—shades of Dr. Alexander Lippisch, author of the rocket interceptor, Me-163. In fact, as I ponder on the air age, its miracle seems that German genius was so counterbalanced by misdirected objectives that it was prevented from taking over all human destiny. But at their best, what a people, what a people! Prowling about the gutted Messerschmitt complex after the Russians had cleaned it of every vestige of plans, tooling, and people, I wrote that if the Soviets could use what they pilfered, the free world had no such technological lead as it supposed. I also wrote that Stalin was a greater gangster than Hitler. Nobody wanted to believe that either.

Convair, following the production frenzy of the war, began probing for its mission in the new era of airpower. Vultee Field at Downey, Cal., was the original seat of this activity. Here the surviving hard corps of engineers began to research for supersonic vehicles, ballistic and guided missiles and all that pertained to both. From these origins ultimately, if not shortly or directly, were to come the Delta Dagger, F-102; the Delta Dart, F-106; the XF2Y-1, Sea Dart; XFY-1, Pogo, first VTO aircraft to fly; the B-58 Hustler, a Mach-II bomber; and the missile family—Terrier, Tartar, Talos, Lark, and the awesome Atlas. Vultee Field was abandoned in July, 1947, but it was a historic cradle.

AWARTIME (1943-45) research project transitioning from piston to turbine power produced the XP-81, using both turboprop and turbojet engines. Next, came research on a proposed Navy night fighter powered with three pure jets. It did better than 550 mph. Turbo-rocket power at that time seemed essential to supersonic flight.

In September, 1945, the Army Air Force invited competitive design for a Mach-I fighter. This was an ambitious proposal since no one yet had broken the sound barrier. (That was to come via the Bell X-1 and Chuck Yeager at Muroc on October 14, 1947.)

However, Convair dug its teeth into the proposal and in the spring of 1946, was authorized to build two prototypes of a multiple-powered ramjet-rocket-turbojet design, designated the XF-92. Originally, the wing called for 35 degrees of sweep but wind-tunnel tests showed poor results. The design team of Frank Davis, Adolph Burnstein and Ralph Shick then began an exclusive research of alternative degrees of sweep.

In the following year involving more than 5,000 hours of wind-tunel tests, the theory of sweepback was replaced by the concept of the delta wing. Far from being the same thing, the term "delta" is taken from the shape of the classical Greek letter which is an equilateral triangle. As we have noted, the German designer Lippisch had seen advantages in this planform for high-altitude, high-speed aircraft, but either through lack of time or oversight, had not arrived at leading edges thin enough to be aerodynamically efficient. The point I wish to stress, is that the Convair designers created the first true delta wing and thus added to the state of design art. It was a break-through.

By late autumn of 1946, the delta-wing research had suggested such advantages that the Air Force authorized construction of an experimental aircraft using turbojet power alone. This was the XF-92A. When well along in fabrication, the plane was taken to NACA's Ames Laboratory at Moffett Field for full-scale wind-tunnel tests. The results were encouraging. The plane was moved to San Diego for completion and from there to Muroc for flight tests. Its progress was retarded by unavailability of an adequate powerplant. Due to war production pressure, jet engine development in the U. S. had been tardy. However, from 1948 to 1950, it was extensively flight tested by Convair pilots and by the Air Force and NACA. Such old

(Continued on page 76)

Many associations, groups and councils represent and protect aviation interests. Because of impending rules and regulations it is most important to know...

WHO SPEAKS FOR YOU IN WASHINGTON?

By KENDALL K. HOYT

[The author has long experience with aviation organizations. "Half of a two-man lobby" for Civil Aeronautics Act of 1938, he was manager of the old National Aeronautic Assn. when Gill Robb Wilson, publisher of FLYING, was NAA president.]

NEW RULES for the control of everything, from the whole of navigable airspace to the low N-numbers on aircraft, are in the making for better or worse.

You still may fly with relative freedom because the national aviation associations are there with facts and arguments.

This is not peculiar to aviation. Most federal decisions involve a tug-of-war between officials, the military, Congress, and the special-interest groups.

The process is bewildering to the average pilot and plane owner because so many are in the act. Officials, too, can get confused.

But when rights are to be protected and needs understood, there is no substitute for the American way of being well represented and speaking up.

If you know how the system works, it will be easier to judge what's coming and maybe get in a word of your own.

Nearly a hundred national associations specialize in aviation, not counting others with a close interest, plus quite a few regional and local organizations.

You don't have to know them all. In a typical problem affecting business and private flying, as many as 30 might have some concern; 20 might be heard from; and only 10 would be hard at work.

There is not always unanimity. Airlines and business flying, for example, might be at odds and the manufacturers neutral between the two.

Private flying interests, however, stand fairly close and no longer are much in disharmony with major airlines and manufacturers.

Policies are agreed through the General Aviation Council, including 10 associations.

National Business Aircraft Assn. (NBAA) represents more planes than the airline fleet, including the nation's biggest companies. It commands respect.

Utility Aircraft Council speaks for the plane makers as a division of Aerospace Industries Assn. of America (AIA) which includes the airframe giants.

National Assn. of State Aviation Officials (NASAO), the aviation commissioners of most of the 50 States, has political power and can be independent in taking the side of home-town airports.

National Pilots Assn. (NPA), comparatively new, is trying hard to find what the pilots want and put the facts on record.

National Aeronautical Services Assn. (NASA), formed by merger of the Aeronautical Training Society and the Aviation Service Assn., includes the larger aviation schools and maintenance bases.

National Aviation Trades Assn. (NATA) includes the smaller and more numerous fixed-base operators, crop dusters, air-taxi services, etc.

All these have Washington offices. Also in the Council are the Aviation Distributors & Mfgrs. Assn. (ADMA), Flying Physicians Assn., National Flying Farmers' Assn., and Soaring Society of America.

Policy votes of the General Aviation Council had to be unanimous; now can be reached by two-thirds with minority reports. The Council meets once or twice a year but the staffs of its member associations are in constant teamwork. (*Continued on page* 118)

Aerial spotting of schools of fish is key operation in a major industry.

'FLY FISHING'

IN THE NORTH ATLANTIC

By CHARLES SPENCE

WHEN THE "sardines are silvering" in the cool waters of the Atlantic off the coast of Maine, hearty fishermen take to their boats —and to their airplanes.

"Fly fishing" has become an important part of the search for the sardine. But not only in Maine is the airplane used for fish spotting. All along the Atlantic, Gulf and Pacific coasts, lightplane pilots, with keen eye of experience to spot a blotch in the water and determine its commercial worth, are aiding their boat-bound brethren in finding the elusive fish.

Typical of these flying fishermen is Hugo Lehtinen, one of about a dozen fish spotters who use aircraft at near-water level to locate fish for the Maine sardine industry. Each day during the sardine packing season from May to the end of October, Lehtinen climbs into one of his Piper Cubs and sets off to spot schools for his fishing boats.

In Lehtinen's airplanes—he has three, of which two are on floats—the only special equipment is a walkie-talkie radio to contact the fishing boats, and his years of experience in searching out the silver sardine and determining, while in flight, whether the fish are the proper size for canning.

Every evening during the last two hours before the "edge of dark" Hugo skims in and out of the coves and inlets of Maine's rugged coast. Often his son, Hugo Jr., is in a second Cub searching other areas.

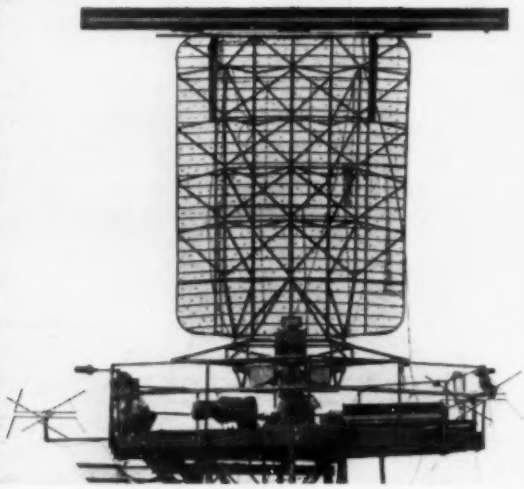
The evening hours for (*Continued on page* 118)

Left: Hugo Lehtinen, typical of the fly-fishermen of the Maine sardine industry, prepares Cub for spotting mission. *Below:* Plane directs boat to catch by radio, then small boats string out the nets.

A GUIDE TO NAV-COM EQUIPMENT

AUXILIARY NAVIGATION AIDS

By B. V. DELTOUR



Left: ASR antenna with antennae added for radar beacon. *Center:* Long-range scope in actual use in modern, busy airport control tower.

THE PRECEDING two installments of this series discussed and evaluated the equipment of the primary aids to aerial navigation. This final article will cover the characteristics and equipment of auxiliary aids that embellish the primary system and improve its overall efficiency. These include the glide-path system, 75-mc fan markers and the magical radars—long range, airport surveillance and precision approach (GCA).

Radar, for the most part, is a self-contained system not requiring airborne equipment for use. All radars operate on the same principal. A burst, or pulse, of radio energy at extremely high frequency, 3,000 megacycles or higher, is transmitted for a few millionths of a second. The receiver then "listens" for a short period for the same signal reflected back from an airplane or other object.

Radio signals travel at a constant rate, 186,000 miles per second, and the distance to a reflecting object can be determined by noting the time it takes the signal to go out and back, then dividing by two since the distance was traveled twice. These reflected signals, or echoes, would be useless without some indication of their direction, so a highly directional antenna system is used. Actually, the radiating element of a radar system is located at the focal point of the large reflecting and focusing system. For convenience the entire system of antenna and reflector is commonly referred to as the antenna.

Most of these antenna systems focus the radio energy into a beam having a horizontal width of five degrees or less and extending from the ground upward to about 45 degrees. The pulses are transmitted several thousand times a second while the antenna rotates slowly. The operator or observer sits before a console in which is located a cathode-ray tube much like the picture tube of your television receiver. The persistence, or time the image remains on the screen after being excited by the electron beam, is much greater than with the television tube.

On a surveillance radar a map of the surrounding airway system and known landmarks is etched on the glass covering of the scope, with the airport or radar location at the center of the display. When the antenna is pointing due north, reflected signals from the airplanes and objects will appear as pips of light directly above the center of the screen. Each time a pulse is transmitted, an electron beam begins to move from the center of the screen to the outer rim making little or no brilliance unless a reflected signal is received. Then it increases in intensity for just a few millionths of a second but long enough to cause a bright spot to appear on the screen corresponding in position to the object from which it was reflected.

A timing circuit produces artificial pulses to brighten the screen at points corresponding to predetermined distances. These are called range marks and result in circles of

The concluding article of an invaluable series covers the characteristics and equipment of auxiliary aids, including the glide-path system, 75-mc fan markers and GCA facilities.

Controllers monitoring surveillance radar.

light on the screen corresponding to distances from the radar every five, 10 or 20 miles as selected by the operator. The direction the beam moves from the center of the screen is synchronized with the direction of the antenna. Ground objects also reflect energy so many radars are equipped with a device called a "moving target indicator" which deletes all ground "clutter" and shows only targets in motion such as aircraft in flight.

Traffic control and surveillance radars are capable only of indicating direction and distance of an aircraft from the radar. Altitude information must be obtained from the pilot. This limitation is the reason Approach Control may often give the bearing and direction of flight of other aircraft, then add the words "altitude unknown." The maximum distance a given radar can spot an airplane is determined by many factors with transmitter power and receiver sensitivity two of the most important.

Not so well understood is the part that the aircraft plays in radar tracking. Radar energy is reflected like light. The larger the reflector the greater the reflected energy. Also, the shape of the reflector has a great deal to do with the amount of reflected energy, a flat surface perpendicular to the plane of the arriving energy reflecting more energy than a convex surface. Often an airplane flying broadside to the radar, and producing a good reflection, will be lost as it turns inbound to the radar due, in part, to a sizable reduction in the reflective area and poor reflectivity of the rounded surfaces of nose and wing leading edges. The FAA solution, adopted by airlines, is to install an electronic transponder that returns a pulse of internally generated energy for each pulse it receives from the radar. This return is, of course, many times greater than that which could be reflected by the airplane alone and enables the aircraft to be seen on radar at extreme distances. Another major advantage of a transponder is that the reply can be coded to return a series of pulses for each radar pulse, which are adjusted in number and spacing to provide positive identification.

The most useful radar for private and business pilots is that used in the approach zone. In most heavy traffic areas, Approach Control is conducted almost entirely by radar to speed up and promote an orderly flow of traffic into the landing pattern. A pilot reporting his position some 25 miles from the airport most likely has been spotted on the Approach-Control radar screen and subsequent position reports will positively identify him. Since Approach Control can see the relative positions and distances of aircraft and maintains radio contact with them for the issuance of instructions and reception of altitude information, it can effectively control traffic over a wider area at a more efficient rate.

Ground Controlled Approach radar, or GCA, is a precision radar in every respect. Unlike the en-route and approach radars, its antenna does not rotate through 360 degrees but oscillates back and forth through a 30-degree sector, the center of which is the approach to the instrument runway. A similar system, operating in the vertical plane from the horizon upward through a 30-degree angle, scans the glide-path area. Thus, the operator can see the position of the aircraft in both vertical and horizontal planes. An ingenious switching system enables a single transmitter and receiver to serve the two antennas and a single scope is used for displaying both vertical and horizontal information simultaneously. Several calibration marks on the scope, generated within the equipment, show the distance from the touch-down point and the desired flight path.

The operator can change the range of these calibrations and does so to provide higher precision as the aircraft nears the airport and touch-down. The controller watches the relative positions of the pips from the aircraft and these calibrations, or cursors, and relays guidance information to the pilot via a radio link to keep him along the approach and glide path leading to touch-down. The system has an accuracy of close to 20 feet near the runway threshold. Actual ILS approaches to airports equipped with GCA are monitored with this radar for increased safety. The controller can acquire the localizer communication channel to warn of an emergency condition on a second's notice.

Of major importance to the private and business pilot, whose aircraft may not be equipped with duplicate sets of navigational equipment, is the fact that failure of the navigational feature of the radio need not prove disastrous if he can maintain two-way radio communications with the GCA controller. Talking him down to a safe landing from an IFR flight is practically a routine operation for the controller. In good weather GCA controllers will be glad to put you through a simulated GCA approach. A non-instrument rated pilot, luckless or foolish enough to be caught on instruments in the vicinity of a GCA-equipped airport, can be brought in safely if he maintains a cool head and doesn't hit the panic button. Nor should he hesitate to request such assistance in an emergency.

Approach-control radar also can be used for making an instrument approach to an airport. The operator can determine your distance from the runway threshold and your position with respect to the extended centerline of the runway but not your altitude. In addition to giving heading information, to keep you aligned with the runway, he will periodically advise of the proper altitude. The pilot must maintain the proper rate of descent so as to be at or near this altitude. Approach-control radar

Glide-slope detector (ILS) installed at Wilmington, N. C. Not a straight line, glide path ends in a flare at the runway threshold.

is not as precise as GCA and, without altitude information, the approved minimum ceiling and visibility are necessarily higher for this type of approach than with GCA.

Another interesting type of radar is presently in use at New York's Idlewild Airport, to control traffic movements on the airport. Operating at extremely high frequencies and with very narrow beam widths, it is capable of determining if an aircraft has one, two or four engines and if it has more than one vertical tail surface.

Some similarity exists between the ILS localizer and glide-path signals; however, there are some important differences. To insure against interference between the two and to reduce the size of the glide-path transmitting antenna system (antennas become smaller as frequencies increase) the glide-path frequency band is from 332 to 335 megacycles, three times that of the localizer transmitters. The localizer antenna system is situated at the far end of the instrument runway while the glide-path transmitter and antenna are usually within 2,000 feet of the approach end and to one side of the runway. Like the localizer signal, the glide-path transmitting equipment produces two patterns of radiation each with its characteristic modulation.

The pattern designating areas above the glide path is modulated by a 90-cycle tone while that designating areas below the glide path is modulated by 150 cycles. A small overlap of the two signals defines the desired glide path and in this area they are of equal intensity. Normal glide-path angles are two-and-a-half to three degrees above the horizon. The glide path is not a straight line but ends in a flare at the runway threshold.

The FAA has 10 glide-path frequencies in operation, and anticipates that a total of 20 frequencies will suffice for the foreseeable future. Of the 167 glide-path transmitters listed in the current Airman's Guide, 155 of them are operating on one of five frequencies with the remaining 12 operating on the other five. In many instances, glide path minimums run to 200 feet, with half a mile of visibility. Back course ILS approaches, minus glide path, are subject to both higher ceilings and visibility limits.

Generally, there is no retuning of the glide-path receiver RF circuits when a new channel is selected. The RF circuits are those that operate in conjunction with the antenna and perhaps the first amplifier tube and at the same frequency as the transmitter. The RF circuits are designed to be "broad band," that is, accept all frequencies in the band. The fixed, or intermediate, frequency amplifiers provide the selectivity to reject unwanted signals. This greatly simplifies the design of the glide-path receiver eliminating all moving parts except those associated with crystal selection. The receiver must have selectivity as good as the localizer receiver, however, as the channels are separated by 0.1 mc.

Since there is no identification of glide-path signals, the only means of determining the glide path to which the receiver is tuned is by the use of crystal control. If a tunable receiver is used for the localizer, the glide-path selector switch will usually be a 10-position device marked with the 10 glide-path frequencies. When digital-tuned localizer equipment is used and it is equipped with an extra section for operation of the glide-path receiver, selection of the glide-path frequency will be automatic when the pilot dials the localizer frequency. This is possible because of the pairing system used by FAA in assigning glide-path and localizer frequencies. We have not mentioned VORTAC and DMET in this series because of the absence of suitable equipment for light aircraft. However, the ultra-high-frequency portion of these systems will be paired in frequency with the associated VOR stations in the same manner so that frequency selection for both can be made with a single control.

In the glide-path receiver are two filters identical to those used in the localizer receiver to separate the 90- and 150-cycle signals from one another. When the two signals are amplified and rectified to DC they are balanced against one another in a metering circuit. If balanced in intensity, the meter will remain centered. If unbalanced, the needle will move to the weaker side to indicate to the pilot the direction to fly to rebalance the signals which will occur along the proper glide path. Unlike the localizer needle, however, the glide-path needle is installed horizontally to indicate "fly up" or "fly down."

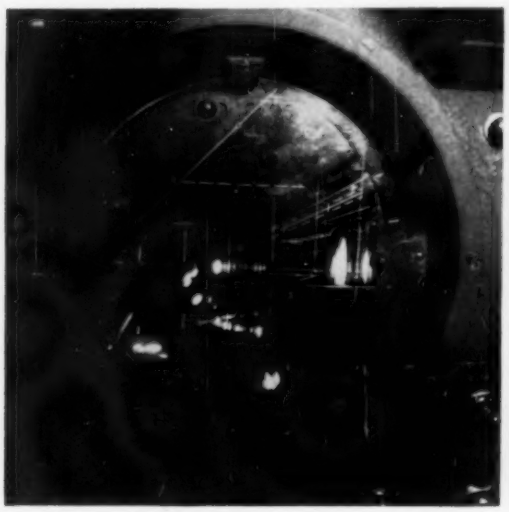
All glide-path receivers have an alarm circuit that operates a flag in the indicator which comes into view whenever the signal is too weak to be usable. Most of the localizer receivers provide a similar flag circuit which appears whenever the localizer signal is too weak. The glide path and localizer are displayed on a cross-pointer meter for ease in flying the ILS. Keeping the two needles centered will bring the airplane a few feet over the threshold of the runway and aligned with its center at which point the pilot takes over visually for the actual landing.

The glide-path antenna is actually a T-shaped device with both ends of the cross bar bent back; something like a capital U with a post in the middle. The ends of the U are insulated and connection to the transmission line is made from the center post. The antenna is only a little over five inches high and is mounted horizontally with the rounded part of the U facing forward. On most twins it is mounted on the tip of the nose. In single-engine aircraft it should be mounted well outside the area where it will be affected by the propeller.

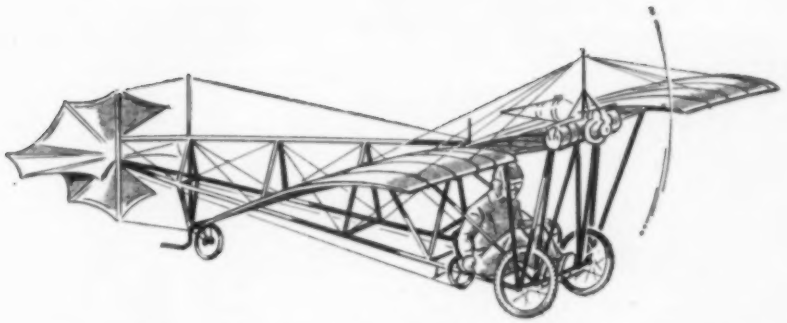
The most economical glide-path receiver sells for $695 and the cross-pointer indicator will cost $180 more than a single-needle instrument.

It is a rare occasion when an owner will install one manufacturer's Nav-Com equipment and another's glide-slope receiver and, since all glide-path receivers are TSO'd, there is really little room or need for comparison. Glide-path receivers are made by Motorola, ARC, Dare, Collins, Bendix and Wilcox with the Motorola 5607 the lowest

(Continued on page 115)



Left: This precision approach radar scope used in GCA systems shows the glide path. *Right:* Air traffic control center at New York.



Delicate as a butterfly when compared to its contemporaries, the ancestor of all lightplanes was the darling of early air shows.

THE BIRDCAGE PARASOL

By HENRY R. PALMER JR.

ON NUMEROUS OCCASIONS during the week-long Aeronautical Tournament held at Belmont Park, Long Island, N. Y., in October 1910, a tiny monoplane became the darling of the crowds—an unwitting comedian lending a touch of drollery to a scientific exhibition that was always dead serious and sometimes a little grim.

It was an absurd looking contraption, even by 1910 standards, with its stubby arched wings that swept out like those of an owl perched for takeoff. Its pilot seat was slung beneath in a cage-like fuselage. The mere sight of it squatting before its hangar brought smiles to the sophisticated and unsophisticated alike.

Barely manageable on the ground, it would buzz back and forth across the park like an injured fly, ground looping, nosing over, bouncing and bumping clumsily. Whenever it managed to jump momentarily into the air, the crowd would roar its approval, and gleefully urge its daring pilot to fly overhead.

The little bug of a plane, waggishly called an "Infuriated Grasshopper" and "Birdcage Parasol," was a Santos-Dumont "Demoiselle"—the world's first lightplane. It had a wingspread of 18 feet and a dry weight of just under 200 pounds. At this meet it was flown mainly for comic relief from the more serious events of the day by two of France's great pilots, Audemars and Garros, but in spite of its comical appearance and bad performance on the ground, it was a stable enough machine in the air, and reasonably fast.

The original Demoiselle had been built in France early in 1907 by Alberto Santos-Dumont, who had made the first powered airplane flight in Europe the year before. At the turn of the century this talented young Brazilian had built a series of powered gas bags in which he had cheerfully risked his life time after time to the joy of doting Parisians. Generally attired in floppy hats, stiff collars and spats, he floated over their heads while they "oh'd" and "ah'd." Flying was in his blood, and deservedly he had become one of France's great national heroes.

Demoiselle was the product of this dapper little man's fertile imagination and delightful sense of humor. Its 50-hp Antoinette V-8 engine, the same one that carried him to fame the year before in his famous "Bis 14," was mounted in the landing gear. To have placed this much weight above the wing would have made the plane top-heavy, besides creating a hazard for the pilot sitting beneath its weight.

The cloth-covered aluminum propeller was driven by a flat belt running over two aluminum pulleys. The entire affair, including the featherweight Santos-Dumont, weighed less than 400 pounds.

The pilot's seat—poste du pilote—was located immediately behind the engine, and consisted of a single piece of canvas stretched between the fore and aft members of the fuselage. From this position the pilot was expected to operate the plane, his seat just clear of the ground, the engine virtually in his lap, his legs straddling its hot manifolds and his toes but inches from the thrashing propeller belt.

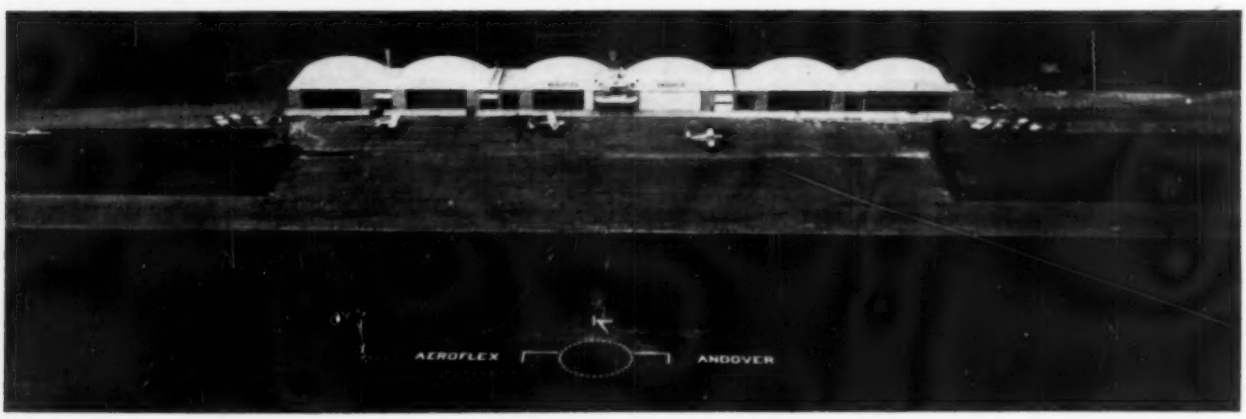
Here sat Santos-Dumont the morning of his initial test flight, amid all the din and clatter of the engine, dashing across the field in an attempt to become airborne. But Demoiselle would not unstick. It became apparent immediately that the engine was too heavy; the propeller inefficient.

The next step was to change to a lighter engine, this one mounted on top of the wing where it could drive directly an efficient wooden propeller. The new engine, a Dutheil-Chalmers, developed 20 hp and weighed about 48 pounds. Now the total (*Continued on page* 123)

Approach to Aeroflex is clean and unobstructed, with company-owned lakes bounding each end of the 2,004-ft. Runway 3-21.

AEROFLEX-ANDOVER

Six hangars, with tower centered between, embrace well-equipped shops for maintenance and overhaul, plus servicing features.



Manned round-the-clock, tower keeps receiving end of Unicom always open.

In the country but convenient to the 'Big City' and open 24 hours a day, this fixed-base operation is truly different.

By MYRON B. GUBITZ

DESPITE the number of fixed-base operators scattered around the U. S., it is difficult to discover one that is really unique. Tucked away in the wooded lake-and-hill region of Sussex County, N. J., is an operation that would be a likely candidate for general aviation's "Believe It or Not," if there was such a thing.

What makes Aeroflex-Andover Field so different? Here are just a few items:

- It is the only helicopter operator in the state of New Jersey.
- It is a relatively small field with a single, 2,004-foot concrete runway, yet it is kept open 24 hours a day, every day, and the runway lights are turned on automatically at sunset and remain lit until morning.
- It maintains complete, modern fire-fighting equipment, including a beautiful, antique fire-truck purchased from the nearby town of Cranberry Lake, and a new, specially designed crash wagon capable of spraying water or chemical-foam.
- It has a small, advisory tower that is always manned, which means there is always someone at the receiving end of the field's Unicom.
- It has an FAA-approved instrument approach, off nearby Stillwater omni, with landing minimums of 800 feet and two miles.
- Every inch of hangar, shop and lounge space is so clean and orderly that it is literally hard to believe.

Another unusual thing about AAF is that it is a wholly owned subsidiary of a large industrial firm—The Aeroflex Corporation, a multi-million-dollar organization whose activities run the gamut from selling building materials and operating automobile service stations to manufacturing gyro-stabilized camera mounts and carrying out aerial surveys.

As it stands right now, Aeroflex-Andover Field is a new, small-but-complete operation that fills a decided gap in northern New Jersey and yet is conveniently close to metropolitan New York. It offers a full range of maintenance and overhaul services for aircraft in the 12,500-pounds-and-below class, boasting six hangars, fully equipped paint shop, engine shop and radio shop, all ranged along its single, well-kept runway. Its staff includes four A&Ps, plus two assistants who soon will have their ratings. There is some tie-down space for week-end transients, but this is limited. Fixed- and rotary-wing instruction are offered, as well as air-taxi and charter in both categories. And thanks to its off-the-beaten-track location and its experienced staff, the service is prompt and personalized, of the variety you rarely find at the busier air service centers these days.

To top off the list of AAF's activities, it is a certified repair station for Bell helicopters and the Hiller Helicopter dealer for New Jersey, part of New York State, Connecticut and Rhode Island. It also has a newly acquired Lycoming dealership, and is on the lookout for the right sort of arrangement to become a fixed-wing dealer as well.

(*Continued on page* 90)

SUPER-V

A SINGLE TO MULTI-ENGINE CONVERSION

By CHUCK BANFE

Pilot Report: Bay Aviation Services' new 200-mph-plus light-twin executive aircraft.

BAY AVIATION'S new executive Super-V, a twin-engine conversion of the single-engine Beechcraft Bonanza, is a 200-mph-plus light transport with increased performance features and pronounced stability that was evidenced during both slow and engine-out flight.

The four-place Super-V, evaluated by FLYING at Oakland International Airport, Oakland, Cal., is listed by the FAA and the Bureau of Internal Revenue as a new airplane. FAA Type Certificate was issued last June.

Cost of standard conversion runs from $22,500, with matching paint, to $25,695—which also includes soundproofing, one-quarter-inch-thick windows and windshield, and unfeathering accumulators. Bay Aviation Services (formerly Oakland Airmotive) feels the light twin's potential lies within the almost 6,000 Bonanza owners who, by turning in a clear-titled Bonanza for conversion, will have made the down payment on Super-V financing.

E. H. (Ed) Gough, president of the conversion company, obtained last year the engineering and production rights to the Super-V from David Peterson, chief pilot for Sinclair Oil, who started the initial engineering and design work in 1955.

Gough feels that other conversions have met with only limited success because they have started out with aircraft which would not lend themselves to the increased performance required from a light twin.

"The Bonanza always has been a high stepper," he says, "and with two engines, it will fly wing with any light twin in the air."

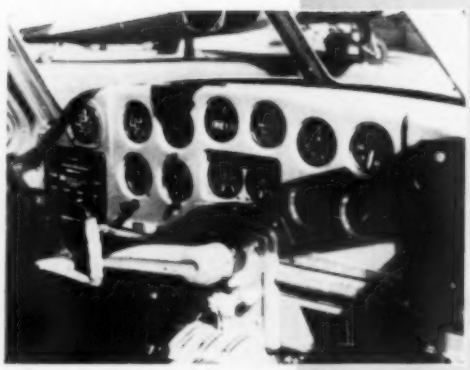
Gough laid out the Super-V conversion as a "complete" package which includes both the conversion and the financing.

"Most Bonanza owners have used their aircraft for business," says Charles Hensel, project manager of Bay Aviation. "That means they have been taking an income tax depreciation which, in many cases, has run out. These ships are costing them tax money now. By converting to a Super-V, a new tax depreciation cycle begins. In addition, most of the Bonanza owners have built up their business flying needs to a point where they are ready for the performance and reliability of a twin.

"The crucial question is: how are they going to come up with the money to buy a new twin, or even a used one with good performance? I think we offer a package that will satisfy all their needs."

At present, both Bay Aviation and its 15 national distributors are geared to do the conversion job in three weeks. They remove the original engine and mount two standard 180-hp Lycoming 0-360s with fuel injection, derated to 170 hp each. Thrust is delivered by Hartzell, full-feathering variable-pitch propellers with constant-speed governors. The single-engine compartment is replaced with a fiberglass section forming a luggage-and-radio equipment space which doubles the Bonanza area.

The main spar is beefed up and thicker skin is attached to the leading edge. Two 30-gallon leading-edge tanks are built in to make a "wet" wing. This, with two 20-gallon bladder tanks, gives the Super-V an "economical" endurance of about eight hours on 100 gallons,



Above: Super-V panel modified only by dual indicators, engine controls. The mixture, cowl flaps and carburetor were eliminated.

(Note: Chuck Banfe plans to circle the world in the Super-V, with takeoff scheduled for mid-October. The sponsors of the trip are Bay Aviation Services, and the State of Hawaii.)

The Bay Aviation Services Super-V over the Golden Gate bridge. Power is two Lycoming fuel-injection O-360s derated to 170 hp each.

and a range of almost 1,500 miles. The takeoff gross weight is upped to 3,400 pounds.

Aft of the firewall and main wing spar, the aircraft is left intact. The instrument panel is modified only for dual indicators and engine controls, because mixture control, carburetor and cowl flaps are eliminated. The heater is replaced with a thermostatically controlled combustion type unit, a Southwind of 25,000 B.T.Us.

Because the customer does not pay anything down, his original Bonanza serving as down payment, he just gets into his new twin and flies it away. Thirty days or more later, he makes his first monthly payments. Interest rates run five per cent with three- and four-year finance plans.

The Super-V, with its slim and waspish lines, looks not unlike a Lodestar. The familiar V-tail of the Bonanza is retained. There is an advantage to leaving the instrument panel unchanged, as most Bonanza pilots have invested heavily in additional instrumentation to get what they wanted.

When the engines start they appear to do a jig due to Dynafocal "floating" suspension of the mounts which dampens torsion and vibration. Taxiing visibility in the Super-V is only fair. The gear warning lights are not easily visible in the bright daylight and could be indicated better with external bulbs.

With an all-up weight of 2,850 pounds, the Super-V was airborne from Oakland's runway 27 and into a quartering 15 mph wind in less than 12 seconds. Indicating 110 mph, the rate of climb averaged out 1,200 fpm to 5,000 feet.

In the prototype the only problem Ed Gough encountered was inadequate engine cooling. By enlarging and fairing the cowl area this hurdle was overcome. What Gough did not expect was the improved performance, a bonus garnered from the change.

From a handling point of view, the aircraft has few kinks to iron out. In 45-degree banks to either side it holds to the altitude with a surplus of aileron control available.

In recovery from awkward positions such as often encountered in strong thermals or in mountain turbulence, the Super-V found its head in a commendable fashion, though two or three (*Continued on page* 124)

Every pilot should read this authoritative briefing on the medical aspects of pressurization.

The Pressure Is On

By JOHN T. FLYNN, M.D.

LIVING at the bottom of the air-ocean, man at sea level is accustomed to 14 pounds of air pressure on each square inch of his body. Air is one-fifth oxygen and four-fifths nitrogen, and its pressure dissolves a quart or more of these gases in his blood and other body liquids. The oxygen that a healthy man needs can be extracted in adequate amounts from the air in his lungs by the red hemoglobin of his blood, at altitudes anywhere from sea level up to eight- or nine-thousand feet. Above this height, man's troubles with altitude begin.

At 10,000 feet, the blood of a man exposed to outside air still obtains oxygen at a comfortable 90 per cent of its capacity; but at 25,000 feet, the blood carries only 58 per cent, and at 40,000 feet practically none. The body is severely handicapped at 70 per cent and near collapse at 66 per cent. *Lack of oxygen is the greatest danger to man at high altitude, despite the importance of pressure changes.*

As an unpressurized aircraft climbs to higher and higher altitudes, the bodies of pilot—and passengers—undergo changes similar to a bottle of champagne when the cork is slowly loosened. The nitrogen and oxygen gases in his stomach, lungs, sinuses and ears, and dissolved in his blood and body liquids, begin to expand. At 8,000 feet, they have increased 50 per cent in volume; if the rate of climb is gradual, the healthy human body makes easy and comfortable adjustments. At 25,000 to 35,000 feet, the nitrogen gas in the blood and body liquids begin to appear as bubbles; at higher altitudes, the bubbles appear more rapidly and in greater numbers, causing the "bends" evidenced by pain in the muscles and about the joints, the "chokes," with burning pain in the chest, cough, a sense of suffocation, brain symptoms, migraine headaches, dental pain, and shock. The champagne cork has popped and man is in serious trouble.

Meanwhile, the gases in his stomach, sinuses, lungs, and ears at 40,000 feet have expanded up to as much as five times their volume at 10,000 feet. The expanded gases seek escape from these organs and may cause abdominal pains but often little else, depending on the speed of altitude change. Beginning at 63,000 or 64,000 feet, body liquids change to water vapor, which among other effects will completely force oxygen from the lungs. Man begins to evaporate.

The answer to these difficulties is simple: man must take both adequate oxygen and adequate pressure with him as he moves toward the upper surface of the air-ocean. In the design, testing, and use of the necessary oxygen and pressure equipment, many valuable lessons have been learned.

Insufficient oxygen at high altitudes is the greatest hazard, since consciousness can be lost rapidly, and both pilot and passenger prevented from carrying out protective and corrective actions. Direct exposure to air at 30,000 feet causes loss of consciousness within one minute; at 35,000 feet, within 30 seconds; at 40,000 feet, within 22 seconds; at 52,000 feet, within 15 seconds.

On the other hand, changes of air pressure with altitude may be surprisingly well tolerated for short periods of time. Very rapid changes of altitude naturally are more hazardous and uncomfortable than slow change; yet numerous tests in altitude chambers have shown that the human body, with the aid of proper oxygen equipment, can withstand without injury the abrupt change of air pressure from 10,000 feet to 35,000 feet within a fiftieth of a second. Decompressions, with adequate oxygen, to 40,000 feet over two to three seconds time have been safe, where lung passageways in the body are open and free of obstruction; abdominal gas pains are rare, in spite of gas rumblings and discomfort on attempts to eructate; brain function can continue normally. A human subject has been decompressed abruptly from sea-level pressure to 62,300 feet for a period of 10 seconds, with loss of consciousness but with good recovery before his body liquids could begin to change to vapor.

However, the human body tolerates such pressure changes only under certain circumstances, and to a better degree under some conditions than under others. Age and certain illnesses diminish tolerance. Increased body fat and muscular exercise increase the tendency of nitrogen bubbles to appear in the blood and body fluids, above 30,000 feet; whereas previous breathing of 100 per cent oxygen for 15 to 30 minutes considerably decreases that hazard.

The length of time during which the human body is exposed to the decreased pressure is extremely important. If an *unpressurized* aircraft continues to cruise at 30,000 feet, three out of a thousand healthy persons will develop the "bends" in the (*Continued on page* 107)

Spotting fish from a flying "Crow's Nest"

When the big Albacore are running in Southern California waters, Roger Hillhouse tracks them down for the fish boats of the San Pedro fleet.

Flying at night, he spots the schools of fish by their fluorescence in the water and reports the location by radio. His flying "crow's nest" is 150 hp Super Piper Cub.

"Night flying over the ocean demands dependable engine performance," says Roger ..."that's why I rely on RPM Aviation Oil compounded.

"When Torbet Aircraft, Inc., Santa Ana, overhauled the engine, we were astounded at its clean, near-perfect condition. Valves and bearings showed no visible wear, rings were free and clear. When you get 2300 hours before major overhaul with these results, you know that RPM Compounded really works... gives you an extra margin of safety."

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STANDARD OIL COMPANY OF CALIFORNIA

Link's new electronic trainer, one of three built for general aviation, simulates light aircraft performance between sea level and 8,800 feet, while operating within a speed range of 85 to 220 mph.

FLIGHT SIMULATOR

for the private and business pilot

It helps maintain maximum instrument proficiency at minimum cost.

By LAWRENCE DOYLE

Link Aviation's current survey of the general aviation market very well may bring into wide use the industry's first low-cost flight training simulator. It also may provide the answer to one of the most pertinent questions of the itinerant pilot—how to maintain one's proficiency with instruments through inexpensive on-ground training?

Under the FAA's new instrument requirement (CAR Amendment 20-12) for private pilots, Link feels that a new market demand has developed for instrument flight simulators. As a result it is now touring the U. S. with a trailer full of its new concept for low-cost Link trainers. All are built around a basic new Model 60 series.

The new 60 series trainers range in price from $1990 for the basic 60M (Mechanical) flight trainer to $19,500 for the complete E (Electronic) and R (Radio) models, replete with flight recorders and other standard support equipment.

Detachable radio-aids unit utilizes 19 individual radio facilities. Automatic features permit instrument and navigation exercises.

Lloyd L. Kelly, vice-president, sales, Link Division of General Precision, Inc., says, "This is the first general purpose flight simulator to be developed since World War II's famous C and A models were produced in '47 and '48." Flight simulators produced in the U. S. since then have been developed around specific aircraft or special military or commercial airline requirements and range in price from $75,000 to several hundred thousand dollars each.

"At long last," Kelly says, "these new trainers have been engineered specifically for the business and private pilot. And they do a more effective job of providing inexpensive coordinated instrument training than anything else available outside of actual flight."

The 60 series, introduced for the first time at the Reading, Pa., Maintenance and Operations Conference, created considerable interest among operators as (*Continued on page* 112)

Winning pilot Aileen Saunders of El Cajon, Calif., right—and co-pilot June Douglas of Fall River, Mass.

AC MAKES IT FIVE STRAIGHT IN THE POWDER PUFF DERBY!

Again in 1960—AC sparked the first place winner in the annual "Powder Puff Derby"—All Women Transcontinental Air Race. This makes five firsts in as many years for AC Aircraft Spark Plugs—and the second win in a row for pilot Aileen Saunders. Mrs. Saunders flew her Cessna 172 "Cool Lady" 2709 miles from Torrance, California, to the New Castle County Airport, Delaware, in 18 hours and 27 minutes—using AC's SR-83P platinum electrode spark plugs. AC platinum electrode spark plugs burn cleaner, last longer—give full firing efficiency for maximum performance on every stroke. If you want these same benefits for your aircraft engine, take a tip from the winners and install ACs with platinum electrodes. They're the best!

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Fatal accident statistics point up the need for simultaneous instruction in both instrument and contact flight.

Training the private pilot

By JOSEPH B. DUCKWORTH

THERE IS A wholly new and proven concept of private pilot training which has emerged since 1955. It is the purpose of this article to trace this new training development, and to show its economic and safety advantages by citing the experimental proof.

If we but stop to think, up to now we have been training the private pilot by an antiquated system in use and virtually unchanged since World War I! For 40 years we have ignored the possibility, for example, of training the private pilot in control of the aircraft by instrument reference *at the same time we teach him control of the aircraft by reference to the natural horizon.* All the fatal accident statistics urgently point up the need for such instruction.

Now we have definite experimental proof that it takes no more time, effort or money to train the pilot from the beginning of his flight instruction, to control the aircraft by *whatever means are appropriate to the flight situation.* Instead of teaching him "contact only," we teach him how each air maneuver may be done *either* by contact or by instrument reference.

Knowing how to make a 180-degree turn, for example, either by reference to the natural horizon (if such is available), or by sole reference to the flight instruments (if a definite natural horizon is not available), prepares the novice pilot for any eventuality. Should he find himself on instruments, it becomes natural for him to extricate himself by utilizing his flight instruments to make a turnaround. Had he been trained only in "contact" flight he would be completely helpless.

To sum up. The new concept trains the new pilot from the first training flight to control his aircraft, *period.* No longer is he trained to control his aircraft only under certain favorable circumstances.

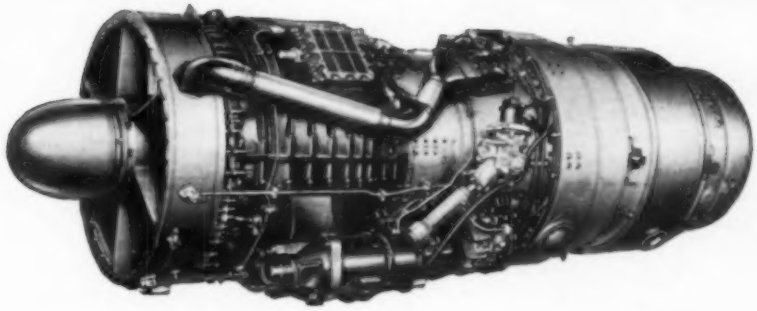
Right here, it is important to note that under the new concept we are not training the private pilot to be a qualified instrument pilot. We are training him only to cope with emergency situations. It should be impressed upon him (and he will see the point if it is properly presented) that in order to engage in deliberate instrument flight, he must have not only further training in *precision* control of his aircraft by sole reference to instruments, but that he also must learn radio navigation, IFR procedures, and a host of other things involving judgment and experience, as well as practice. Also, to be "legal" he must pass all tests and requirements for an FAA instrument rating.

There are, of course, two "systems" of basic instrument flying. The first, the "1-2-3" or "needle-ball-and-airspeed" system developed by Howard Stark in 1931, utilizes only the "partial panel" (airspeed, turn-and-bank and altimeter). This system, since the development of the artificial horizon and directional gyro, is a system limited to small aircraft and/or to emergency type situations.

The second system, involving extensive attitude and power coordination through a "full panel" of instruments (i.e., artificial horizon, directional gyro, airspeed, turn-and-bank, sensitive altimeter and rate-of-climb) is a "precision" system first developed and described by Frederick B. Lee, at one time administrator of CAA. In 1941, when he wrote the first paper describing the system, Lee was a Navy flight instructor at Pensacola.

The new concept of training the private pilot simultaneously in both instruments and contact flight may utilize either the partial-panel system or the full-panel system, depending on what the student is being trained *for.* By all means, if the student expects to be a commercial pilot, he should be trained on the full panel, at least eventually. If, on the other hand, the student never expects to fly commercially, it may be better (depending on the facilities available and the instruments the student will have available in his later flying activities) to train him on partial panel, (*Continued on page* 122)

ROLLS-ROYCE AVON



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Let's get the show on the road! Zippy unknots the tie-downs. Flying's his dish but not the bumps—his complaints top engine noise.

Old way is still best—swing it! Zippy owners fly 70,000 miles yearly in Apache.

Anyone got a match? Zippy's master says chimp will be mechanic in his old age.

Good thing Quesada didn't see that! Zippy can keep the airplane level.

Did you notice that landing? A grease job! Zippy flies about 400 hours a year.

Simian Shenanigans

Zippy, the TV star, lives and breathes flying!

ZIPPY, an internationally famous show-business personality, flies wherever he goes, usually in a Piper Apache belonging to his owners, Ralph (in pictures at right) and Kathleen Quinlan. Until the Quinlans bought the Apache four years ago, the threesome traveled the airlines.

When they used the airlines, they were mobbed at every terminal. Life on the airliner was a riot. Zippy charmed everybody.

"Sometimes he forgets he's human," says Quinlan, "and sometimes we forget, too."

Excess luggage charges—including Zippy's bicycle, high chair, Hoola Hoop, make-up kit, pillow, blanket, fruit and thermos bottle, added up to a tidy sum. Now Quinlan drives a rented car up to the Apache, unloads, and hurries into town.

Despite 400 hours flying time and 70,000 miles logged each year in the Apache, Zippy never tires of flying, sometimes takes the wheel and keeps the aircraft straight and level.

There comes a time in every plane's life when it's...

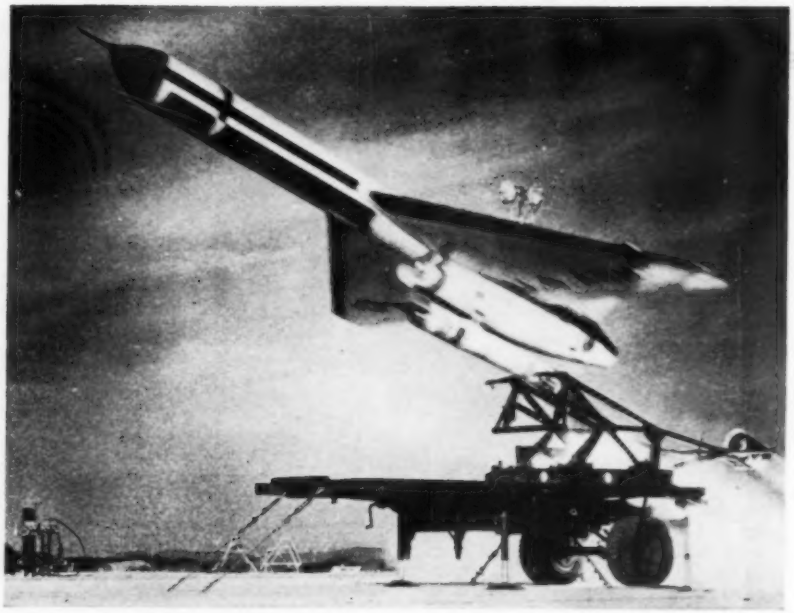
TIME TO TRADE

RIGHT SEASON, VALUES PLUS, NOW!

For demonstration rides, call your Cessna dealer now. (See Yellow Pages.) Also ask about finance or lease plans. Or write: Cessna Aircraft Company, Dept. F-11 Wichita, Kansas.

9 FLIGHT\SWEEP CESSNA AIRPLANES—ONE FOR EVERY BUSINESS NEED

FLYING NEWSREEL



SURVEILLANCE DRONE. *Right:* Delta-wing surveillance drone, AN/USD-5, developed by U. S. Army Signal Corps and built by Fairchild Engine & Airplane Corp., is powered by turbojet engine and equipped with electronic gear capable of providing ground commanders with information on enemy position. Drone, launched by jato unit, continues flight on turbojet mounted on underside of body.

OUT OF THE PAST. This Waco 9 powered by Curtiss OX-5, 90-hp water-cooled engine recently has flown from Miami, Fla. to Amityville, N. Y. and was placed on permanent exhibition at Freedom Land. Originally, the first mail plane owned by Pennsylvania Air Lines, back in 1927, it was purchased by Horan Transportation Co., New York City, from Air Carrier Engine Services of Miami. Flight to New York took 22 flying hours, included two forced landings, luckily without damage. Greatest problem was overheating. Bill Rhode was pilot, owner Horan, copilot.

FRENCH UTILITY PLANE. Wassmer Super IV, light, four-place personal plane has exceptionally roomy cabin that can be converted for either cargo or ambulance use. Fuselage is tubular. The wings are of wood. Engine is 180-hp Lycoming O-360, top speed is 170 mph.

RUSSIAN TURBOPROP. Said to be replacement for Soviet medium-size piston-engine transports, the 30- to 40-passenger AN-24 turboprop airliner is capable of operating out of unpaved airports. Takeoff run is less than 1,750 ft., cruising speed 320 mph at 20,000 feet.

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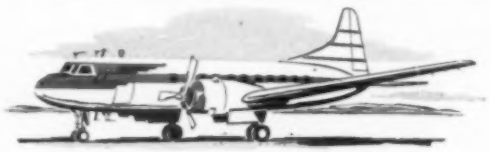

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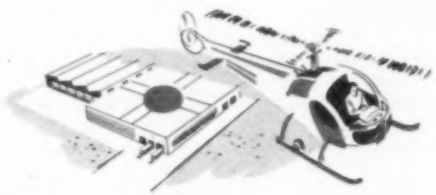
Dispersant non-ash additives keep ring grooves and oil drain holes free from deposits . . . reduce all kinds of engine deposits, soot, sludge and lacquer.

4. EASIER STARTING AND FASTER WARM-UP—Extra-high viscosity index reduces thickening of oil when cold, yet maintains an adequate film when hot.

2. LONGER ENGINE LIFE
Reduced engine-parts wear and lowered oil consumption permit longer operating time between engine overhauls.

5. LOWER OIL CONSUMPTION
Operators of light planes, airliners and helicopters report 12 to 40% decreased oil consumption.

3. REDUCED WEAR ON ENGINE PARTS—In comparable service, piston ring wear has been reduced up to 30%.



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AVAILABLE IN 2 VISCOSITY GRADES:

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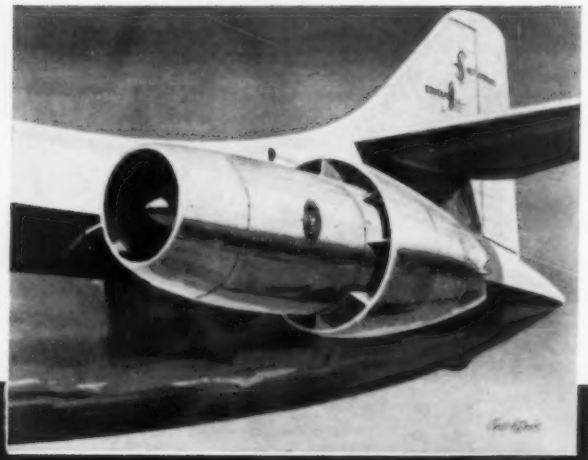
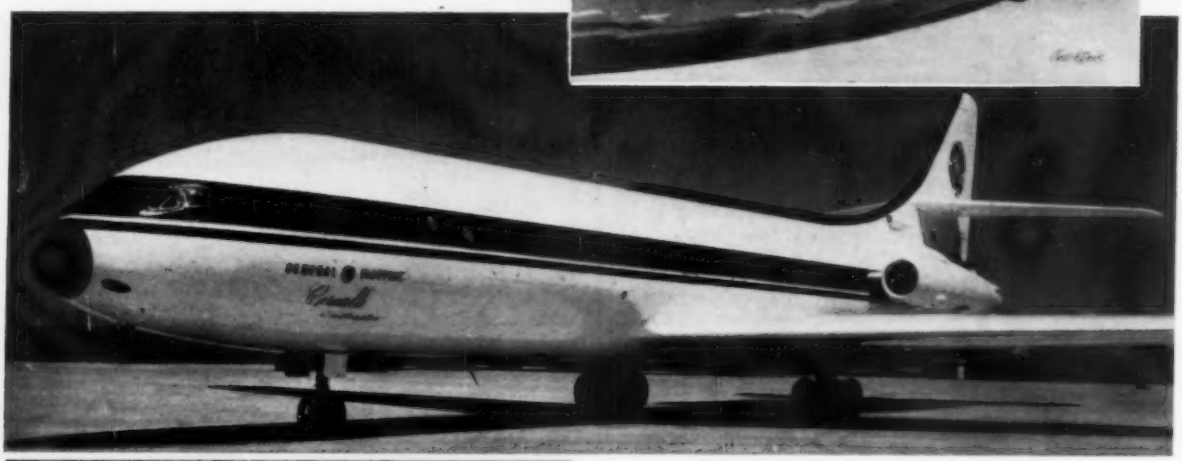
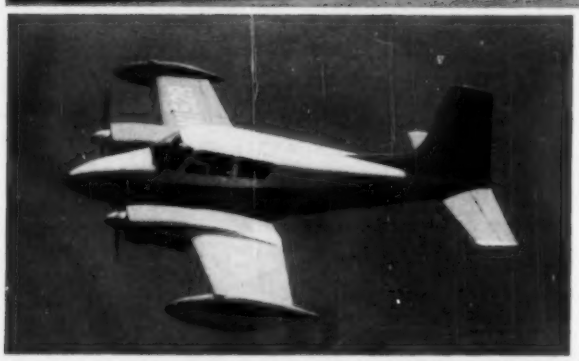


CARAVELLE VII. *Right:* Drawing of the G.E. CJ-805-23 aft-fan engine installation on the Sud-Aviation Caravelle which will be sold and serviced in the U. S. by Douglas Aircraft Co. Nacelles for the powerplants also will be manufactured by Douglas. General Electric purchased a Caravelle III from Sud, below, will install the 16,000-pound thrust engines at its flight test center, Edwards, Cal. The CJ-805s will give the aircraft a cruising speed of 540 mph and extend range by 40 per cent, to 2,000 miles.





RILEY 310R. *Left:* Conversion of Cessna 310 by Riley-Kelly Aircraft, Ltd. Ft. Lauderdale, Fla. Modifications consist of installation of under-wing exhaust system and addition of two 20-gallon fuel tanks in area formerly occupied by Cessna exhaust system; one-piece windshield; choice of either 240-hp or 260-hp fuel-injection Continental engines and aerodynamic cleanup. Range is 1,430 miles, cruising speed with the 260-hp fuel-injection engine is 230 mph.

VANGUARD. *Below:* First of the Vickers Vanguard 952s scheduled for service by Trans-Canada Air Lines is undergoing Certificate of Airworthiness flights. T.C.A. has on order 23 of these 96-passenger turboprop airliners, powered by four Rolls-Royce Tyne 11 engines of 5,545 eshp each.

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Executive Bonding... anchors plates and separators to case, completely prevents plate-destroying vibration damage Only Rebat has it!

Add other exclusive aircraft battery features plus a quarter century of dependable performance and you'll see why Rebat is first choice of men who build, own, fly and service aircraft.

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MONOLITHIC CONSTRUCTION — — — NEW HIGH STRENGTH CASE

THE ELECTRIC AUTOLITE COMPANY Battery Division Toledo 1, Ohio

NO. 245

I learned about flying from that!

There is nothing like an unnecessary and "hairy" engine failure on takeoff to confirm the value of a checklist!

By CARL F. HILKER JR.

ASK ANY PRIVATE PILOT what he considers the most dreaded flying situation barring fire in the air and structural failure, and chances are he would answer without hesitation: "engine failure on takeoff." Over the end of the runway with perhaps 150 feet of altitude in an overloaded lightplane, and heading toward bad terrain, would be the least desirable position he could imagine.

An imaginary mid-air situation would rate high on the nightmare list, but a "mid-air" would not involve the ghastly anticipation that is the prime prerequisite of a really entertaining nightmare.

In my own case, I had at least eight seconds of soul-searching "fun" before my living nightmare came to an end. I had experienced the celebrated "short circuit between earphones" and made a common mistake with a different twist.

I was returning from a skiing weekend at Mt. Tremblant, Quebec, with a rented Piper Clipper in March, 1954. After dodging snow squalls from Saint-Jovite to Montreal, I was trapped by darkness at Burlington, Vt., my airport of entry. My first mistake that weekend was to try to make an international flight "on a shoestring." Upon landing at Burlington, I was socked for $23.00 worth of goodwill, compliments of U. S. Customs and Immigration authorities for entering the United States on a Sunday, thanks to a medieval law of which I was ignorant. (I had not heard of the *International Flight Information Manual* in those days.)

This financial blow compelled my three passengers and me to spend the night at the house of a friendly and understanding Northeast Airlines ticket agent. The four of us were students at Dartmouth College and our combined wealth, after buying gas and satisfying the government, was about three dollars. I must confess that this also was due to fanciful living at Mt. Tremblant by two of us and, I suspect, even more fanciful living by the other two passengers that spent the weekend in Montreal, necessarily so, for the snow field at Saint-Jovite is no place for overloaded planes.

We planned a dawn takeoff in order to make the remaining 72 miles back to Lebanon, N. H., in time for Monday morning classes.

After understandably light breakfasts, we were ready to roll at the crack of dawn. I methodically preflighted the plane, visually inspected the gas tanks and noted that the wing tank was full (I had filled it the night before), and the nose tank practically empty. This was necessary, because we were at our maximum gross weight with one dry tank.

A Piper Clipper weighs somewhere around 1,650 pounds and uses a 115-hp engine to haul four people about on 29 feet four inches of wingspan, about six feet shorter than the span of a Cub. A saying I had heard was that, in a fully loaded Clipper, you drove the first 20 miles and flew thereafter. However, in spite of a heavy load, the Clipper consistently would break ground in a surprisingly short distance (probably that cold Yankee air)! It was the rate of climb that suffered, but for good reason. In addition to the four, average 170-pound occupants that "Five-One-Hotel" had to carry, I had removed the rear partition of the baggage compartment to accommodate two pairs of skis, four ski poles, two pairs of ski boots, three overnight bags, two heavy blankets, and assorted extra jackets and overcoats. (Even in March, at a lowly 4,000 feet, the temperature was near zero.)

Besides the weight involved, the skis and poles actually protruded back into the empennage of the aircraft, being lashed directly to the longerons, thus placing our center of gravity at the rearmost allowable limit. I always will have a soft spot in my heart for a Clipper, but all in all, this was not the trip to be practicing slow flight at any altitude!

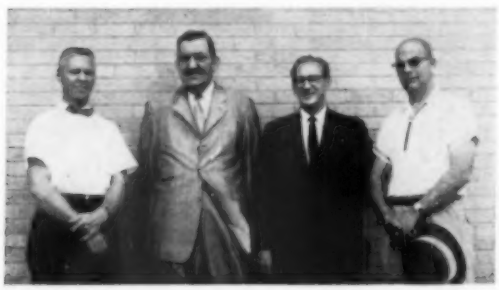
I ran up the engine, went through the rest of my checklist and thought, "I'll do all my taxiing on the near-empty nose tank and then switch tanks immediately prior to takeoff." This was a purely psychological plan. I wanted to empty the nose tank as much as possible while on the ground, leaving the full wing tank untouched for the actual flight and any reserve needed. I soon was to learn that the disadvantages of such a plan far outweighed the single dubious advantage of knowing that I wouldn't have to switch tanks for the rest of the trip, regardless, if there was only one that contained any gasoline. By trying to simplify an already simple airplane, I got into trouble. (*Continued on page* 113)

Show Place for General Aviation

(Left) William O. Coleman, for the past nine years Airport Manager of the Department of Airports, Oklahoma City. Under his planning and instruction, a dream became a reality. (Right) Maurice A. Marrs (Brig. Gen., USAF, ret.), Supervisor of Tulakes . . . an active pilot with 22,000 airline and ATC hours.

Tulakes Air Terminal Building, Oklahoma City . . . undoubtedly one of the finest devoted exclusively to general aviation.

Customers benefit from keen rivalry between Tulakes' two operators. Service with Phillips 66 mobile refuelers is thorough.



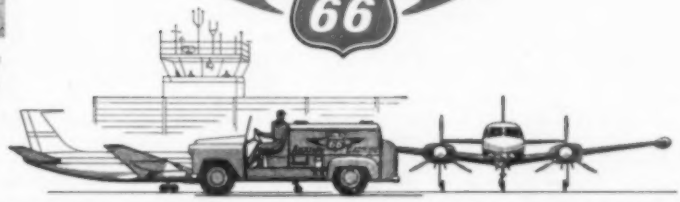
Friendly competitors: (left to right) Bob Burke and Roy Aitken of Sky Service . . . Norm Blake and Johnny Johnson of Air Sales.

Around Oklahoma City, general aviation is in good hands . . . thanks to the model facilities and efficient services provided by Tulakes Air Terminal. Devoted exclusively to personal and business aircraft—this municipal field boasts two asphaltic concrete runways (5800′ and 4565′), 14,500 feet of well-planned taxiways and a new air conditioned terminal building that houses, among other things, FAA Weather and Safety Offices, car rental agency, lounge, and a restaurant famous for its steaks. Downtown Oklahoma City is 8 miles away . . . excellent motels with courtesy cars are even closer.

Tulakes tower operates LF, VHF, and UHF from 0600 to 2200 . . . runways and tetrahedron are lighted all night. Until the ILS system is installed sometime in 1961, IFR approaches are authorized via Oklahoma City Omni using Tinker Field Radar and Will Rogers ILS.

In addition to being the home of Aero Commander, Tulakes has two fixed-base operators—Air Sales, Inc. (Beechcraft) and Sky Service Company (Cessna). Both provide 24-hour service—charter, flight training, sales, major and minor repairs . . . and complete refueling service with 80-, 91- or 100-octane Phillips *66* Aviation Gasoline. Other facilities include tie downs, transient hangars big enough for DC-3's, and crash-fire-rescue equipment manned around-the-clock. *No landing fees!*

PHILLIPS 66



AVIATION DIVISION • PHILLIPS PETROLEUM COMPANY • BARTLESVILLE, OKLAHOMA

Fixed-Wing Aircraft

(Continued from page 23)

Eastward at Lock Haven, Pa., Piper Aircraft Corp. reports sales 18 per cent above the comparable nine-month period of 1959. Piper has delivered 2,141 units compared to 2,365 for the same January-through-September period last year. Annual production for 1960 is expected to reach at least 2,500 units.

It is interesting to note the first six-month '60 breakdown of Piper plane models, in units delivered: 225 Aztecs, 81 Apaches, 736 Comanches, 327 Pawnees, 184 Super Cubs and, over a nine-month span, 505 Tri-Pacers. In every case, with the exception of Apaches, the rate exceeds or almost matches the yearly figure for '59. Apache production was restricted to make way for the new Aztec.

First deliveries of the Aztec (designated the UO-1) to the Navy—five aircraft—began in August. Seven were delivered in September and eight are being delivered to the military this month. Piper's Vero Beach, Fla., research and development facility is expanding to over 100,000 sq. ft. and, at Lock Haven, ground has been broken for a new engineering building. Additional office space of 20,000 sq. ft. already has been completed.

Certainly, of all the producers of business planes, Aero Design & Engineering Company's concentration on twin-engine, high-wing and high-performance aircraft has earned it a bright place in the sun. Some 100 of the new Aero Commander 500-series will be produced this year; a jump of about 20 per cent over production for 1959.

"Next year," says T. J. Harris, vice-president and general manager, "we anticipate an increase in production of 25 to 30 per cent over this year . . . As powerplants are available, we plan to take full advantage of the opportunity for faster, better performing aircraft."

Extensive design changes and new powerplants have increased speeds of the 500-600 series to the 220-mph-plus category. New fuel-injection engines include the Continental IO-470-M and the Lycoming IO-540-BIA, IGO-540, and IGSO-540, ranging from 260 hp to 380 hp, which power, respectively, Commanders 500A, 500B, 560F, and 680F.

Aero Design's employment increased from 746 in January to 935 in June. Current production runs to 18 aircraft monthly, with deliveries running about five months from placement of order.

Mooney, Champion and Aerocar also plan increased production over last year. Champion and Aerocar plan new models. The latter intends to market an "AERO-Plane" version of their famous roadable-plane model and it will be known as the Model II. According to company officials, a well-known aircraft marketing agency is working with the builder on plans to produce 1,000 AEROCAR units—this is the roadable model which the firm feels is still very much "in the lightplane market's future."

Champion plans to push new models utilizing higher horsepower engines for 1961. One is the (7GCb) Challenger which features the Lycoming (O-320) 150-hp engine, and the other is the (7KC) Olympia.

Sole entrant in the single-engine amphibian class, the four-place Lake LA-4, is reported by the Sanford, Me., company to go beyond the simple limits of being just a new model. President Jack Strayer says, "Its performance characteristics are substantially altered from anything that has gone before." New specifications include performance improvements all along the line: speed is increased to 131 mph, stalling speed reduced by two mph (to 50 mph), range has been increased to 627 miles, power loading is reduced (Lycoming O-360A1A, 180 hp), wing span has been upped four feet, length increased by 1 ft., 5 in. and height by 6 in.

Major new LA-4 design changes reduce takeoff distance to 1,125 feet (water) and 650 feet (land). Strayer reports orders from 11 foreign countries as well as domestic buyers. He expects sales to expand in foreign markets where the specialized features of the amphibian make it a highly useful business aircraft.

Some of the shine and sparkle has left the large twin-engine turboprop class, as approximately 70 such aircraft, flying pennants of America's leading companies, become commonplace visitors at airports and air terminals throughout the country. In March of '59 the Fairchild F-27 was about to make its debut into business plane circles. By August, the Grumman Gulfstream was ready to roll. Two Vickers Viscounts were delivering yeoman service at the hands of two business operators.

Caught in the backwash of surplus piston transports discarded by airlines, the turboprop manufacturers have, however, encountered rough going. Realistic forecasts show excellent growth potential but the rate has been slowed by the low unit cost of the surplus and more conventional Convairs, Martins and DC-3s.

Also figuring in the tightening market are the pure-jet business planes: the Lockheed JetStar, North American Sabreliner and McDonnell M220C class. Many potential buyers who have signed letters of intent to buy turboprops are reportedly stalling on final commitments until the new jets are operational.

Despite the unscheduled watering-down of the market, the turboprop sales should be expected to settle down following the first flush of interest attending its long delayed debut.

Initial sales forecasts based upon studies carried out two and three years ago, have not proved out. But current owners and operators are enthusiastic about the new planes and it seems reasonable to expect a gradual increase in deliveries as the surplus, lower-priced twin-engine transports are absorbed by the broader civil plane market.

Status reports on turbine-powered airplanes are sketchy and incomplete but these figures have been reported: Fairchild F-27 sales to date number 30, but unfilled orders are "not for publication." Most recent inventory listed the names of 20 companies and their chief pilots, who have taken delivery of an estimated 23 F-27s. Fairchild reports that production of the air-

(Continued on page 74)

Lake Amphibian

Meyers 200-A

Morrisey 2150

Fornaire F-1A

Transland Ag-2

On Mark Marksman

The new Beechcraft Model 65 Queen Air, with big 340 hp supercharged fuel injection engines, carries 6 to 7 people and their baggage at more than 200 mph, cruises at altitudes above 30,000 ft.

Fly it and see for yourself...

Here's The New 6 to 7 Place Business Plane That Pilots Say Is Beyond Comparison

Professional pilots and aviation editors don't pull their punches when they discuss a new plane. Many of them have flown it and compared for themselves. So when you find these tough-minded experts singing the praises of the new Beechcraft Queen Air, you can bet it's a mighty sweet airplane.

Here is the airplane in which nothing seems to have been left out that pilots or passengers could possibly want. And for good reason: the Queen Air was specifically designed to include all the modern airliner features America's flying business leaders and executive pilots have told us they wanted in an executive transport. Features like . . .

Here is just one of many custom interiors offered in the new Beechcraft Queen Air. Optional appointments include extra chairs, adjustable lounges, food bar, coat closet and office aloft equipment.

- **Large, roomy separate pilot compartment,** with sliding door privacy. Adjustable chairs. Dual flight instruments. Engine instruments in the center of the panel—along with radios and radar, within easy reach of either pilot.
- **Spacious "conference room" passenger cabin** with wide center aisle, individual airliner-type reclining seats and big double-paned windows.
- **Airliner-type "air-stair" door** with big, wide steps that reach to within inches of the ground.
- **Huge baggage compartment, accessible in flight.**
- **Airliner-type completely private lavatory aft.**

As the aviation editors say, "This is it!" We say, "Compare the Queen Air and you'll agree." For details of low-cost Beech financing and leasing plans, write Public Relations Dept., Beech Aircraft Corp., Wichita 1, Kansas, U. S. A.

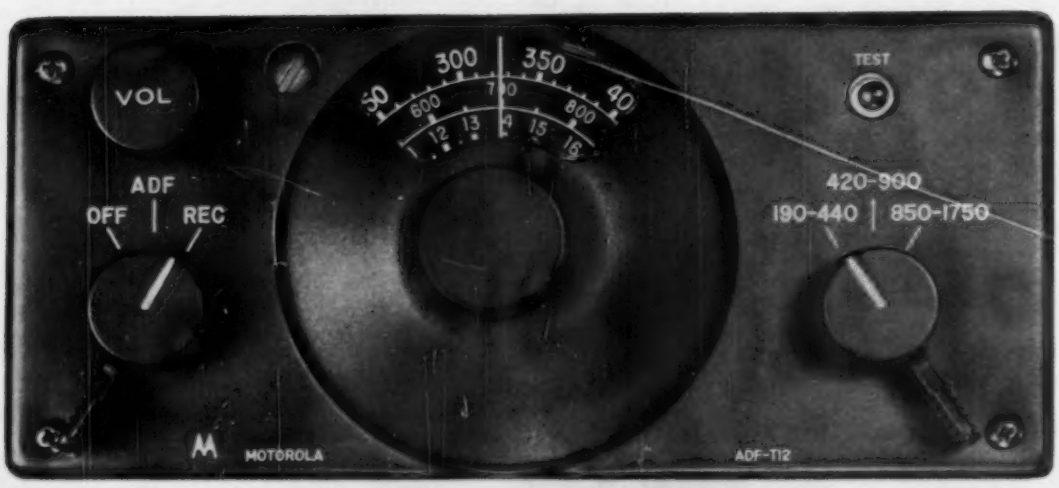
Beechcraft

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

READY TO FLY

NEW MOTOROLA ADF-T-12

COMPLETELY TRANSISTORIZED!



Weight reduced 50%
Size reduced 70%
Current Drain reduced 85%
Transistorized reliability
Lower installation cost

The new Motorola ADF-T-12 (T for transistorized) is the featherweight, miniaturized version of the Lear-developed ADF-12—the world's largest selling automatic direction finder.

Total solid state design (transistors, diodes, printed circuitry), conservatively rated components, improved packaging techniques, and over 20 years of ADF design experience combine to provide these substantial advantages:

- weight cut in half; size reduced 70%; reliability greatly increased.
- full size 3-inch azimuth indicator for maximum readability.
- world's smallest, lightest fixed loop; does not require mechanical compensation for quadrantal error.
- powerful audio output for both headset and speaker.
- minimum installation—receiver fits standard (ADF-12) panel opening.
- universal operation: operates on either 14v or 28v electrical systems without modification—except for panel light bulb!
- modular construction simplifies, speeds maintenance.

Plus these additional features: On-Off switch located on receiver panel; bearing accuracy test switch supplied; planetary tuning-dial drive provides maximum calibration accuracy, no slippage or backlash; CW oscillator optional accessory; tuning meter optional accessory.

See and test-fly the latest addition to the Motorola ADF-12 series at your nearby Motorola dealer now!

MOTOROLA
Aviation Electronics, Inc.
A SUBSIDIARY OF MOTOROLA, INC.

10916 W. Washington Boulevard, Culver City, Calif.

(Continued from page 70)

craft is not scheduled until a firm order is received.

Grumman Aircraft & Engineering Corp. reports delivery of 47 aircraft as of August this year and its '60 production will total 44 Gulfstreams. This Rolls-Royce powered twin-engine business turboprop has met with wide acceptance but it, too, must reckon with the coming of the pure jet business planes.

Hanging in suspension are the converted turboprop Convairs—the Allison-Convair 340-440 models and the Canadair-Eland-powered 540. In the Allison program airplanes have been sold for business use—an additional order includes a Lake Central Airline requirement for 10 units.

No information is available on corporate plane sales of the Canadair 540, although the airplane is being converted to Eland power for service with Allegheny Airlines.

The pure jet corporate plane market has been adjudged thin and tough by many research organizations. Estimates as to realistic sales potential vary from 90 to 120 airplanes over a period of three to five years. If this condition is true, the coming of the Lockheed JetStar, Sabreliner and McDonnell M220C will make thin pickings for all contestants. What's more, it will place high premium upon all large corporate plane sales in the turbine class, whether they're pure jets or turboprops.

Lockheed's $1,300,000 JetStar first flew in September 1957, powered by two Bristol Orpheus engines. Lockheed's four-engine prototype, powered by Pratt & Whitney JT-12s, recently completed three years of flight testing; the first production model flew at the company's Marietta, Ga. division in July of this year. Five production models are tagged for use in the FAA certification program.

Lockheed now has 16 JetStars in the process of manufacturing. Deliveries of the JT-powered corporate aircraft start early in 1961, and are earmarked for customers in five countries, including the U. S., Canada, West Germany and Italy. Lockheed reports 22 executive and five military (designated the C-140) on the books; sees a potential 600 sales over the next ten years, half of which would be military.

The 600-mph JetStar was developed in answer to an Air Force invitation to the aircraft industry to design and build an off-the-shelf utility jet aircraft. It won the competition, and during delay over receiving the go-ahead for military production, Lockheed went into corporate production. The military order for the airplane came recently.

Without substantial military orders, profit prospects are thin indeed if all companies battle for a share of the pie.

With Lockheed's hat already in the ring, North American Aviation, holding military orders for the USAF T-39 jet trainer, decided to hold its action until October when management says it will declare its position with respect to a commercial model of the twin-jet, six-passenger version of the Sabreliner.

On the other hand, McDonnell has remained silent since its first flurry of action with its 10-passenger M220C, four-engined jet, less than a year ago.

Other producers of twins in the modified category, On Mark Engineering with its Marksman, L. B. Smith with its Tempo II, corporate versions of the DC-3s, Convairs, Martins, DC-6s and Mustang two-place models, will command a large portion of business that ordinarily will not go into the newer $1 million-plus turbines. These programs may prove marginal where profits are concerned but the effort will result in healthy expansion of the bigger plane market on the long haul.

As for the turbine-powered light-twins and single-engined aircraft, it is generally agreed that they are five to seven years away unless military pressure accelerates build-up of turbine operating time—and this could happen.

Beech Aircraft is reportedly working on a turboprop design employing the Pratt & Whitney PT-6 turboprop. Cessna also is believed to be working on a Continental turboprop aircraft and on the development of a commercial version of the Cessna T-37 Continental J-65-powered jet trainer.

Yes, the signpost for the future of business and civil aviation is optimistic. Whether the unrestrained nature of the interpretation is warranted or not, may be argued in many corners. But, realistic appraisals support the cause for jubilation, despite the fact that the bigger plane outlook is less bright.

One fact of life is evident: for some time to come, the larger corporate plane market cannot support the full design, development and production costs of turbines. Military and other civil aircraft orders must help bear the load.

Here are some basic factors likely to play a major role in the long-range development of a healthy, broad-based civil aircraft market:

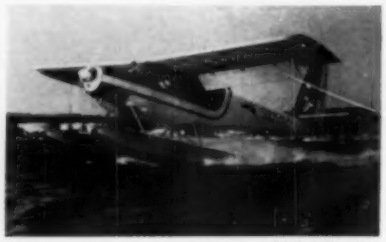
- The growing popularity of co-op industry family-lease plans where several companies share the cost of using executive air transport (turbine and large, conventional twin sales are expected to benefit from this means of developing new business users).
- Growing use of straight charter flying by industry groups, even where surface transport is competitive to scheduled air travel.
- A gradual but continuous increase of executive flight students in the new pilot pipeline.

Such realistic optimism and hope for the future of business aircraft is deserved. The signs are positive and strong. Other factors not mentioned above are the placement of airplane financing on about the same basis as boat ownership; and the fact that used plane sales are pacing the rise of new lightplane purchases.

The soft spots confronting the large twins are real, not imaginary. Astute management and strong salesmanship are needed to bolster this department. Any annual assessment of industry health could not be fair or complete without attention being directed to these danger areas.

The overall goals will be won by good salesmanship, careful management planning and realistic forecasting of market potentials long before a plane design takes shape on the drawing board.

FLYING hails the optimism but urges unthrottled initiative to make it stick! END



Helio Courier

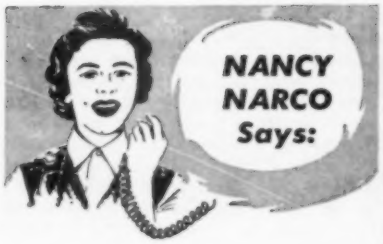
Schweizer 1-23H-15

Fairchild F-27

Bellanca 260

Tempo II

Champion Challenger (ag)



SYMPTOMS

When you turn over an ailing radio to your radio service man you can help him do a more intelligent—and less expensive—servicing job if you can explain to him some of the symptoms of the malfunction. Just as the family doctor can cure you faster if he knows whether you have a headache or corns, so your electronic service specialist can put his finger on trouble quicker if you can tell him some of the specific malfunction problems.

For instance, he'll want to know the degree of malfunction of your radio and, if it's a multiple-purpose NAV/COMM radio like the Superhomer or Omnigator, he'll want to know whether the whole radio is dead or whether only one of its functions is ailing. He'll want to know whether the radio is inoperative only on the ground, while taxiing or in the air.

If your receiver is giving trouble, he'll want to know whether you have audio—that is, can you hear communications or the code signal of an Omni station, but get no Omni indication? Or is the situation reversed—Omni OK but no audio? If the cabin speaker is dead, can you still get audio through the headphone?

If you have transmitter troubles, is there side tone—that is, can you hear yourself in the headphones when you speak into the microphone?

In the case of Omni malfunction, what is the approximate degree of error? Does the amount of error differ for "to" and "from" signals? In the case of the Omnigator, does it continue to operate on localizer function? Does the malfunction occur only on certain headings?

In the case of crystal-controlled equipment, is the unit completely dead or is it dead only on specific crystals? For instance, is it dead only in the 118 megacycle band or is it dead only when you set it, say, at four-tenths of a megacycle?

And don't forget to do a little trouble-shooting yourself. Transmitters work a lot better when the microphone's plugged in!

Regards,

Nancy

Ft. Washington, Pa.

for safer, easier ILS approaches with lower minimums... install the

narco UGR-1

GLIDE SLOPE RECEIVER

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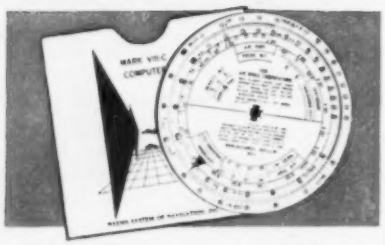

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Convair

(Continued from page 45)

pros as Sam Shannon, Captain "Chuck" Yeager, Maj. "Pete" Everest and others wrung it out and, although it lacked the cobs to push past Mach I, they found it to have great potential.

In 1951, the weapons system concept now having come into vogue, Convair was authorized to develop a delta interceptor which would carry the Hughes Falcon homing missile, and house the Hughes MA-1 fire-control system. The designation of this aircraft was F-102 which will go down in history as the first operational delta wing.

Not to become engrossed with the aerodynamics involved in the delta wing, it might be interesting to note briefly certain advantages that accrue from this radically new airfoil.

Recently at Elmendorf Air Force Base, Alaska, Major Bob Casey, a top-hand with the "102," enthusiastically explained to me that behind his low-level, slow-speed demonstration of the airplane lay its wonderful inherent power-curve stability and control characteristics. Absence of a distinct stall point and of adverse trim effects at low speed invoked his admiration. This is impressive because fundamentally the target of the delta wing is better performance at extreme altitude and at transonic and supersonic speeds. The military pilot is always looking for stability of his gun platform under combat conditions. He simply can't shoot or bomb if his aircraft is continuously fighting him at combat throttle.

Under modern conditions, the pilot may be in combat in the transonic range, where he could expect wing buffeting and control reversal. Here, the delta wing traverses the so called barrier without more than a tremor.

It should be noted, too, that the delta wing provides a larger airfoil area than any other planform without invoking penalty in weight or performance. The engineer finds his structural problem simplified since he can get exceptional strength and rigidity in relation to weight. Additionally, he can use the large wing area for integral fuel storage.

The concept of the delta planform might well have fallen on its face, however, had not another fortunate element of research come to its rescue. This was provided by one of NACA's aerodynamists, Dr. Richard Whitcomb, who developed the "area rule" wherein by a pinching in of the fuselage where the wing is largest, he could greatly reduce transonic drag.

In 1953, Convair reoccupied Plant Two in San Diego and, still researching and testing in the field of the weapons-system interceptor, began to turn out an occasional operational aircraft. Production went into high gear in November, 1955, and Air Defense Command received its first F-102A in the spring of 1956. Four production orders followed, including the trainer, TF-102A.

Meantime, the F-106, an advanced weapons-system interceptor, was being tooled up in two versions—the single-seat 106A and the two-place version, 106B. Slightly larger than the F-102, the F-106 is more versatile, both in performance and in advanced armament and fire control. It is more than an expanded version of the 102, yet is largely a result of its predecessor. The student of airframe construction would notice that the 106 cockpit has been moved forward and lowered in the interest of pilot visibility and better locating of electronic equipment. He would notice, too, a larger and more swept vertical fin and larger air-inlet ducts moved aft to a point barely ahead of the leading edge of the wing. The Whitcomb area rule in the 106 is more accentuated than in the 102.

A novel aircraft type based on the delta wing was the Sea Dart, featuring a retractable hydro-ski. This plane, the XF2Y-1, was the first water-based plane to achieve supersonic flight, but the prototype came apart during a demonstration in San Diego.

Another experimental type was a proposed shipboard fighter capable of vertical landing and takeoff, the XFY-1 Pogo. This aircraft was successfully flown through its company testings and introduced some promising possibilities but, like the Sea Dart, did not go into production.

Another of the "Delta" family, which did become operational, is the Mach II B-58 Hustler whose home, like that of the B-36, is the Fort Worth Division of Convair. First flown late in 1956, the Hustler has been the subject of stretchout and exceptional re-evaluation as to its role in defense strategy.

Probably no aircraft of modern times has involved so broad a range of technology or so many varied subcontractors. It is truly a weapons sytem. Significantly, it reverses the trend toward size—a crew of three: pilot, navigator-bomber and a defensive systems operator. For the first time in weapons-system history, the company was assigned management of all auxiliary equipment involved in both the recon and bomber versions of the plane. Just to list the innovations and describe the functioning of the electronic brains of the B-58 would require a volume. Some 15,000 companies have been involved in development of its components or in the servicing of them! The B-58 is without doubt the deadliest operational manned weapon devised to date.

And now, before turning away from Convair's genealogy of aircraft, we must note that eventually the company did enter the field of heavy civil transport with the jet 880 airliner, competitive with the Douglas DC-8 and the Boeing 707; and with the 600, a medium range four-jet engined airliner with a Mach .91 speed. The 600 is pointed toward use of many intermediate airports with lesser facilities and runway length than the great metropolitan terminals. Building at San Diego, the 880 has recently entered airline service after exhaustive tests. Both models feature various innovations, too soon to detail because their career is still to be written in commerce. They will be current news rather than recorded history for many months to come.

It also might be mentioned that research of an aircraft configuration to utilize nu-

(Continued on page 78)

WING TIPS

FIX NICKS. Check metal propellers regularly for nicks and have them filed smooth as soon as possible. Nicks can develop into cracks, and cracks can result in the breaking of blades while in flight.

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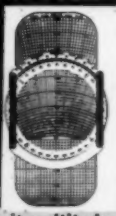

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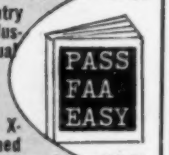

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(Continued from page 76)

clear propulsion continues apace. Initially, we may anticipate that such an airframe will revert to large dimensions, heavy weight, extended fuselage length and probably a straight or swept wing rather than delta shape. Original testing of the prototype undoubtedly will be with conventionally proved powerplants. Unless a crash program is instituted or its schedule of development interrupted, the projected nuclear "X" model should take the air within several years. It certainly will not be pointed initially toward supersonic speed or extreme altitude. At this point, the most interesting observation in its regard is that it will be a manned aircraft.

That Convair's modern history is inextricably wound up with missile development is logical in view of its long years on the frontiers of airpower. The philosophic effect of pioneering is the open mind. Having looked toward the stars so long the great aircraft corporations must perforce continue to so look. The missile is both a cause and an effect in that process.

Convair's first guided missile originated as an antiaircraft weapon and progressed to become a major tactical system. The company entered this field before the end of World War II via Navy search for a supersonic, ramjet beam-following missile to thwart attacks such as those of the Japanese Kamikaze. The Applied Physics Laboratory at Johns Hopkins University, Baltimore, Md., has established a reputation by development of the proximity fuse. Now it was commissioned by Navy to explore the potential of an antiaircraft missile. The laboratory, in turn, chose Convair to develop the airframe and assist with the ramjet engine.

The entire project proved complicated, and was stretched out because by now the war was over. However, much had been learned by 1948. Navy realized its project had unwittingly evolved into a powerful tactical weapon to be driven by rockets, rather than the ramjets originally used by the Germans. The missile was named the "Terrier," and in its wake came an entire family of rocket-propelled guided missiles. So broad was the scope of their use, both offensively and defensively, that by 1951 Convair had created a guided-missile division and Navy's Bureau of Ordnance had begun construction of a reserve ordnance plant.

Here, in a great complex of research, engineering and production, Convair was put in charge and renamed its guided-missile program the Pomona Division.

Out of the original search for an antiaircraft missile—the so-called "bumble bee" project—also came Navy's aerophysics laboratory at Daingerfield, Tex., operated for Navy by Convair which managed the various corporations and universities engaged in the high-Mach ramjet research. Convair became extremely active in this form of power, because in those days it was felt that ramjet propulsion might serve not only the antiaircraft rocket, but well might become conventional propulsion for aircraft with supersonic capability. As a result of all this interest, Daingerfield, too, became a division of Convair.

Convair entered the field of ballistic missiles in 1946, via a research and development contract from the Army Air Force looking toward a 5,000-mile-range missile equipped with an atomic warhead. This seemed a visionary concept at the time, since the German V-2, the only precedent, had but a 200-mile range. However, numerous important innovations came from the effort. One was the idea of the separable nose cone; another, attainment of directional control by swiveling of the powerplant; a third, employment of the missile conformation for integral fuel tankage.

By 1947, defense budget reductions eliminated further work on the research missile which had been designated "Hiroc," and the ICBM thereafter, until 1951, was a matter of Convair's own convictions. Company funds were employed continuously as available, and produced added innovations such as electronic tracking; accessory rockets for velocity control; and the so-called "one-and-one-half" staging, to improve rocket reliability.

In 1952, nuclear science made radical progress in development of infinitely more powerful and smaller atomic warheads. Likewise, the international situation had worsened. Convinced that an intercontinental missile was more than a dream, Convair urged that the ICBM be given better priority.

The Air Force agreed and in 1954 not only put Convair on a "crash" basis with its Atlas, but brought Martin as well into the picture with a supporting program. This was the "Titan."

The Atlas weapons system began production in 1955, and here once more, an instrument originally conceived for one utility, evolved for another of equal importance. In this case, the Atlas not only became an intercontinental missile, but a ladder of potential to probe outer space.

Based on this potential, Convair then created another division, Astronautics, devoted to space technology.

Convair stands today, more than an industrial corporation but almost a frontier in itself, as will be recognized. We have not sought to write the history of a company, but rather to make it stand out from the facelessness which ultimately characterizes any corporate structure so broad in its interests and so varied in its products. It is a pity that this facelessness is a natural consequence of bigness, for in essence there is so much of human dedication and courage and faith wrapped up in the evolution of such a giant corporation that I sometimes question whether its products are as important in the long run of history as are the qualities of its people.

Many people took their lives in their hands to make Convair what it is. Many others risked professional reputations, personal fortunes, livelihood, creature comforts. The thread of continuity from the dreams of Gallaudet and Morse and Fleet to those of current leadership is more significant to society than the thread of continuity from the TW-3 trainer to the Atlas. True, we must use technological evolution to measure results of intelligence and character, but let us not be misled. Men are at the heart of everything. END

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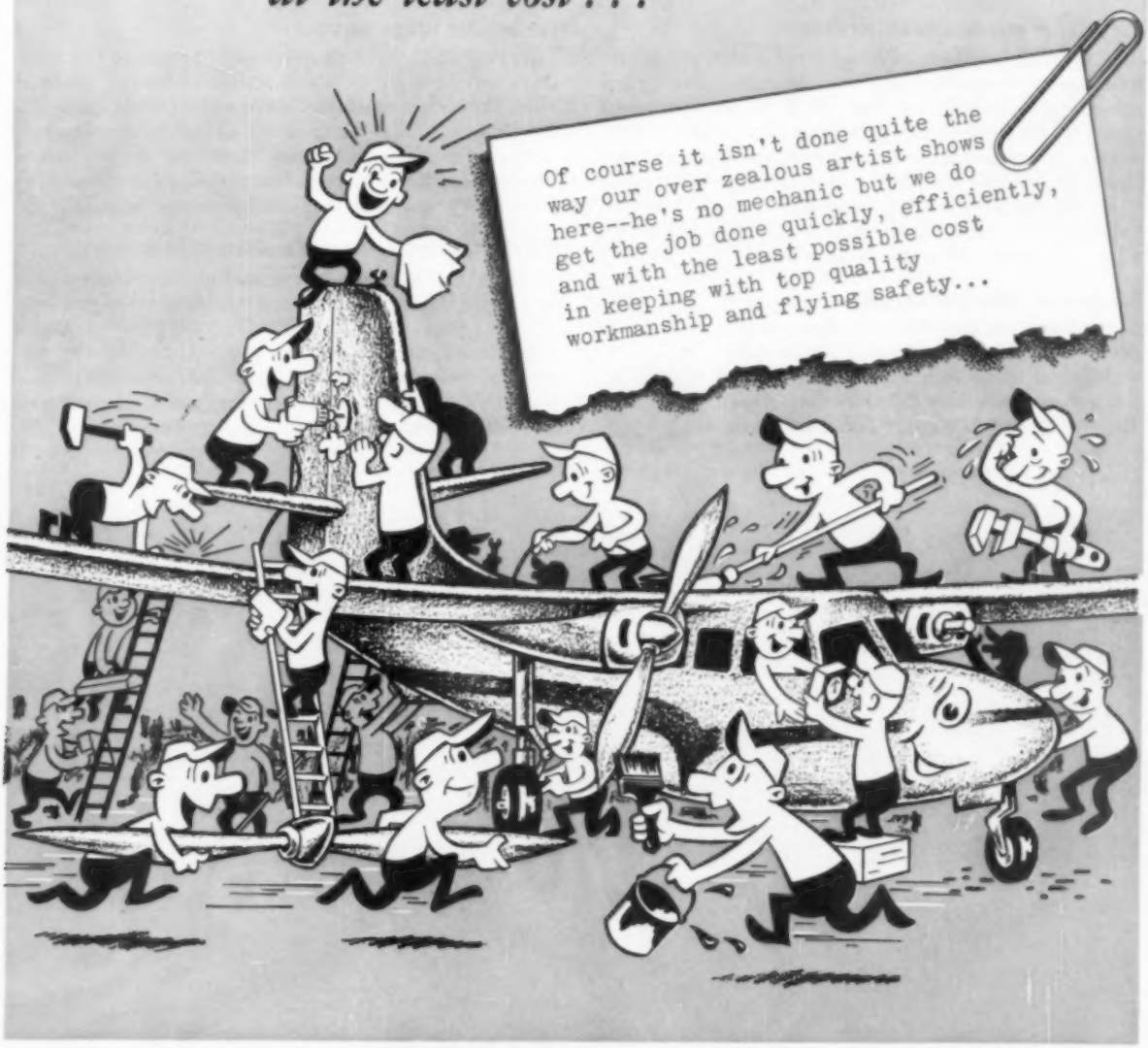
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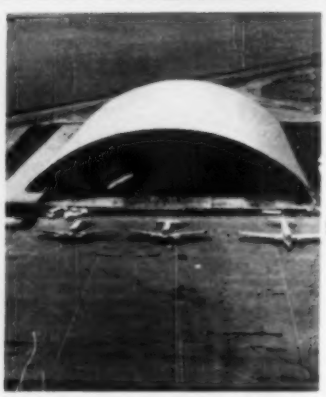

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Powerplants

(Continued from page 29)

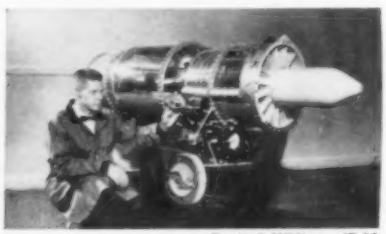
tage of the turbofan is its high takeoff thrust and low SFC rating which results in improved range, payload and airfield takeoff capabilities.

Neumann feels that at this time there are no requirements for 1,000-hp turboprop engines, though stating that this does not rule out their possible use in the future. De Havilland, which produces the T58 on license from GE, has developed a turboprop based on this engine, with design available if the market opens.

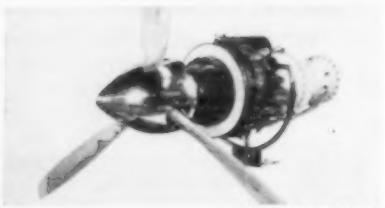
General Electric is continually studying the small (less than 1,000 hp.) engine market, as are most manufacturers, but at this time is not involved in development work. Neumann strongly opposes the use of twins to power light aircraft, principally, he told FLYING, "because of the high costs involved over a single engine for the same job. High initial costs and control complexities make this use impractical for economy reasons. The twins, when directed into a single gearbox, do not have engine-out performance and this, of course, is the big advantage in using two engines. I feel twins used independently are much more practical, although costlier than larger single engines."

While there is no announced application for GE's 355-lb., 2,700-lb. thrust $45,000 CJ610 (basically a CF700-2 without aft-turbofan components) at this time, one manufacturer has expressed intent to use the engine. Light-weight aircraft would be under 15,000 lbs. and could grow into the turbofan weight class. GE's CF700 has been designated for the McDonnell M220, which recently underwent refurbishing. The CF700, combining the military J85 gas generator and a scaled-down version of the company's CJ805-23 aft-fan, will be certificated in December, 1961.

The fan type engine gives gas turbine designers a much wider latitude than they have in the past to meet any given set of aircraft requirements. The ducted fan type can be developed from almost any type of pure turbojet engine or gas generator. Fan sections usually are constructed in one or two stages and have a larger diameter than the basic jet engine to which they are added. Result: the fan engine will move a larger volume of air at a slower speed than the pure jet engine and will, therefore, be more efficient.



Pratt & Whitney JT-12



Continental 217-6A

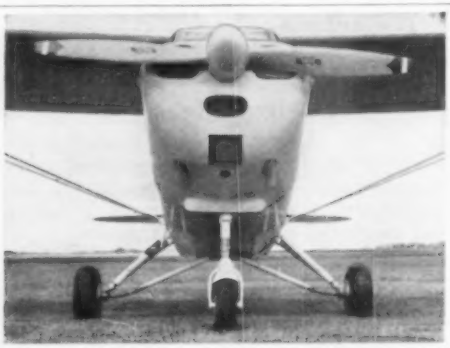
Pratt & Whitney's JT-12 turbojet, weighing but 436 lbs. and rated at 3,000-lb. takeoff thrust, already has received its airworthiness type certificate from the FAA. Prototype engines are flying in the JetStar, with production engines scheduled for delivery this month.

The JT-12 makes possible 600-mph speeds for executive aircraft. Engine also is being test flown in North American's Sabreliner and the single-engine Canadair CL-41 jet trainer. Pratt & Whitney has proposed an 500-hr. time between overhauls for this powerplant, which would mean that private aircraft frequently will operate 12 months or more between overhauls. Decision to develop this engine was first made by P&W in July of 1957; it moved from design to production of the first prototype in less than two years.

Canada's first turboprop—the small, 250-lb. free-turbine PT-6, with a takeoff rating of 500 eshp.—is under development by Canadian Pratt & Whitney Aircraft for light aircraft. Military designation is T74.

The PT-6, with a power-weight ratio of 2-to-1, will be produced in two versions: the 250-lb. PT6A-2 turboprop, aimed at light single- and multi-engine aircraft and VTOL airplanes, and the 225-lb. PT6B-2 turboshaft, aimed at helicopters. Cost of

(Continued on page 84)



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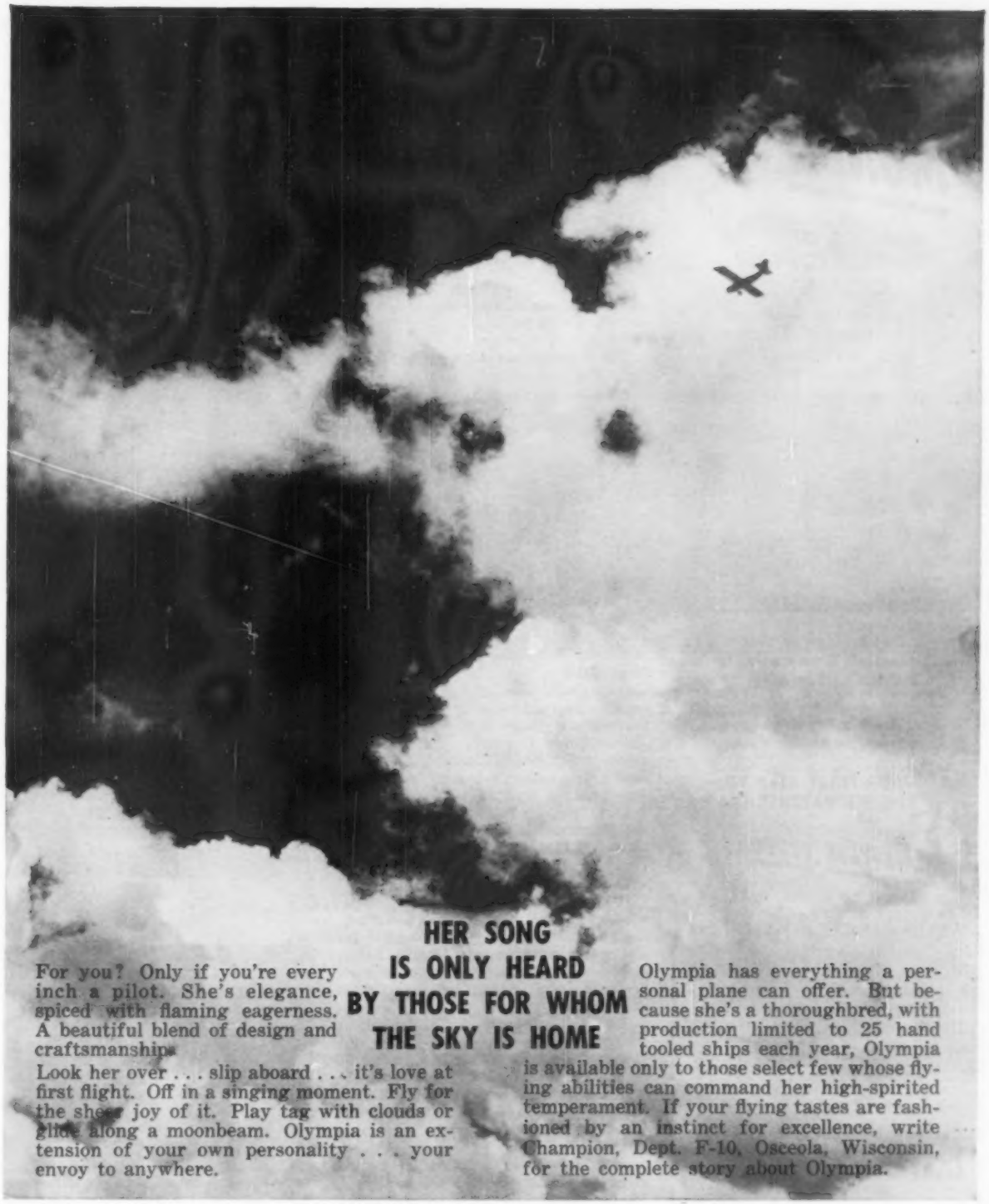

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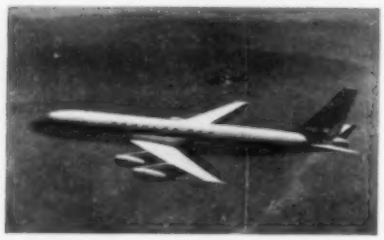

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(Continued from page 82)

this engine may approximate $15,000. Design details were initiated early in 1959.

Both Beech Aircraft and the armed forces are looking hard at this small engine. A Beech Model 18 aircraft is being modified to carry a PT-6A in the nose. Army, for instance, has expressed need for a small turbine which will be strongly considered in their helicopter competition for a small, four-place rotorcraft, of which over 1,000 units are expected to be ordered.

The T63, being designed by the Allison Div. of General Motors, also is beamed to the military need for an engine in the 201- to 350-hp class to power light utility helicopters and small fixed-wing observation aircraft. Development work is being done under military contract.

The T63 will weigh less than 140 lbs. compared to a piston engine of 300-350 lbs. required to produce equivalent horsepower. It will be capable of its full horsepower even on a 100-deg. day at sea level ambient conditions and up to 9,200 ft. on a standard day, Allison stated to FLYING. To perform equally well a piston engine would require a supercharger which would add about 25 per cent to its weight.

More than 20 manufacturers of light fixed- and rotary-wing aircraft have expressed an interest in the 250-hp engine, according to Allison. Initial deliveries of prototypes to airframe manufacturers are slated to start in January, 1961. Official 150-hr. military testing is set for September, 1961. Production military engines will be available in January, 1962.

Boeing's 502 and 520 series of small gas turbines is progressing very rapidly. This year the Navy selected the 270-hp Boeing T50 to power Gyrodyne's drone antisubmarine helicopter, and the 50-hr. preliminary flight-rating test was successfully completed for the 430-hp Boeing T60-BO-2. Arrangements have been made to put the T60 into the air this year in a helicopter produced by a company other than Boeing.

During late 1960 and through 1961 Boeing will make several prototype installations which will, they predicted to FLYING, demonstrate the immediate potential for the small turbine. Boeing feels that their emphasis on rugged single-stage components, free-shaft design and interchangeable engine parts will pay off when the turbine break-through into the small aircraft field becomes a reality.

A Boeing turbine set one world's record: in mid-1953 an altitude mark of 37,063 feet for light airplanes was set by a Cessna XL-19B, powered by a 502-8B turboprop.

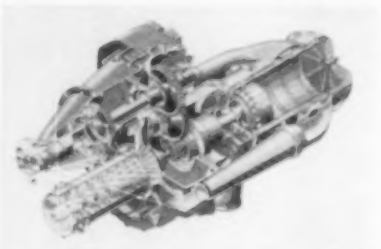
Continental Aviation and Engineering Corp. (Detroit, Mich.) has under development its 217 series of light gas-turbine engines, with first models available next year. The 217-5 and 217-6 powerplants employ shaft power for application in the field of conventional propeller-driven fixed-wing aircraft, rotary-wing, and VTOL.

The -5 turboshaft and -6 turboprop and their variations employ a common set of aerodynamic components including single-stage transonic axial compressor, a single-stage centrifugal compressor, a single annular combustor, a two-stage axial turbine (for driving compressor and accessories) and a single-stage axial turbine to provide output power. Engines are rated at 500 shp. Dry weight varies from 210 to 230 lbs.

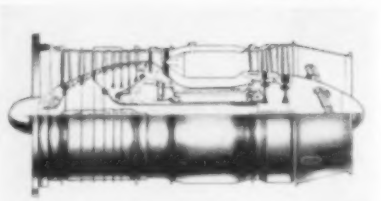
Continental's CJ69-1025, the military version (J69-T-25) of which powers Cessna's T-37 USAF jet trainer, and which is earmarked for the commercial version of that jet airplane, is FAA certified. Its Model 141, for a pressure-jet helicopter, is undergoing certification. The Turbomeca-built Artouste IIC (for which Continental is licensee) has been FAA certified for U.S. installations.

On the piston-engine side, Continental Motors Corp. (Muskegon, Mich.) is working on additional applications and development on their own fuel-injection system,

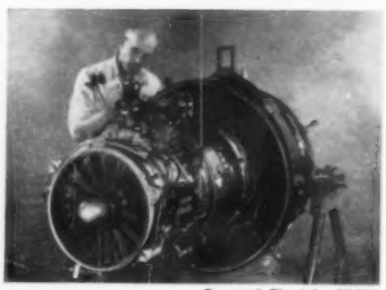
Continental J69



Allison T63-A-1



General Electric CJ610



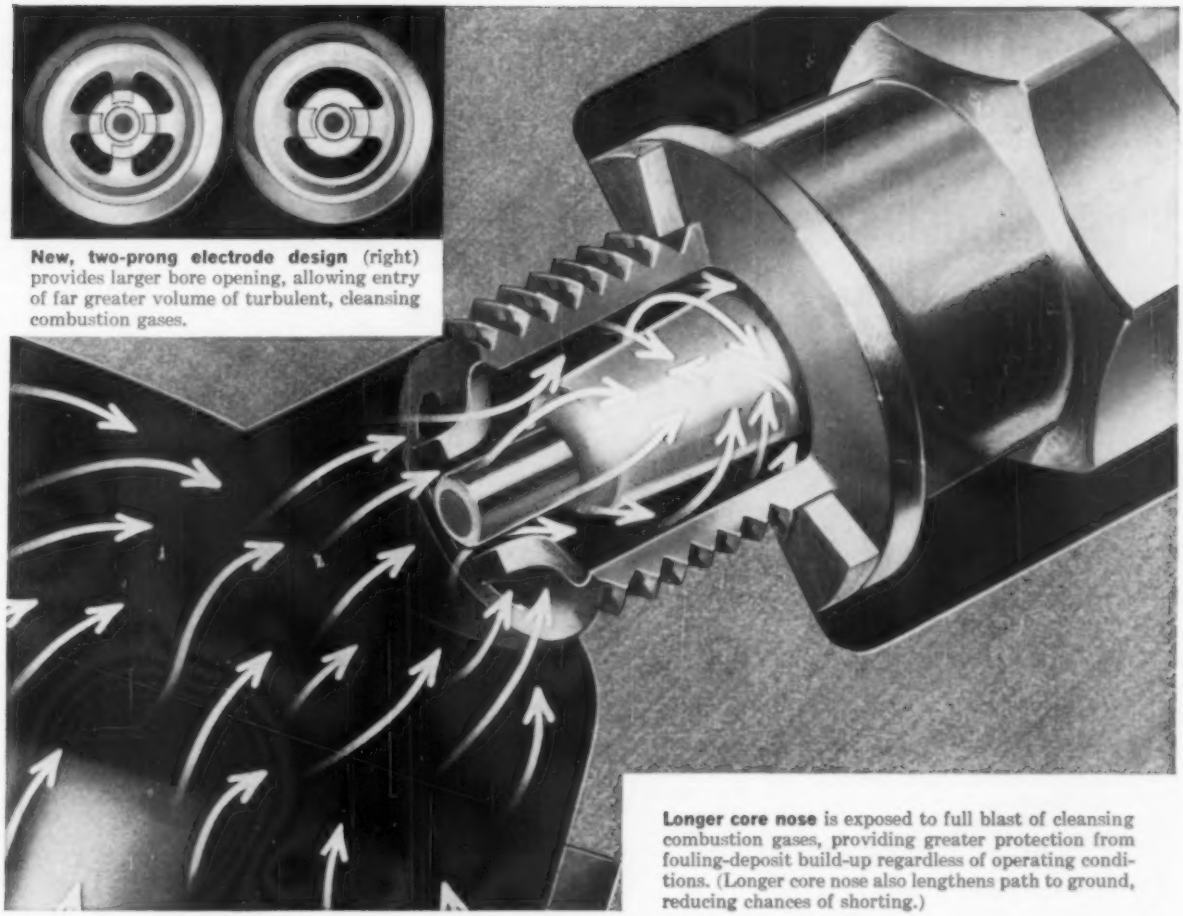
General Electric CF700

reduction gearing, and simplified turbo charging. Their new models will be in the higher horsepower ranges, designed to meet the requirements of modern utility and business aircraft.

Continental feels the extent of applications of the turboprop and pure jet—for light aircraft—will be entirely dependent upon factors such as cost, reliability and serviceability—and the advantages that

(Continued on page 86)

New, two-prong electrode design (right) provides larger bore opening, allowing entry of far greater volume of turbulent, cleansing combustion gases.



Longer core nose is exposed to full blast of cleansing combustion gases, providing greater protection from fouling-deposit build-up regardless of operating conditions. (Longer core nose also lengthens path to ground, reducing chances of shorting.)

Now approved for all commercial applications!

Here's why Champion's new REM40E and REM38E spark plugs resist fouling

The two-prong electrode, longer core nose and bigger bore let combustion gases blast the firing end clean!

Newer, higher-efficiency aircraft engines—requiring higher octane fuels with greater T.E.L. content—have inadvertently *increased* the old problem of spark plug fouling.

To cope with this problem, Champion has developed the new REM40E and REM38E plug types—*now* approved for *all* commercial applications: Pratt & Whitney and Wright engines as well as Continental, Lycoming, Franklin and Jacobs engines. In the firing end design, a two-prong electrode combined with a larger bore allows greater entry of turbulent combustion gases. These gases blast away core nose deposits. And the core nose itself is longer—which allows even greater exposure to cleansing combustion gases.

The advantages of the new *foul-resistant* plug design are these:

- Fouling protection, regardless of severity of operating conditions—from idle through takeoff to prolonged flight. Smooth, *full* power *all* the way.
- Relief from unscheduled plug removals.
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Extensive field evaluation tests have been run on the new plugs—all kinds of equipment, all kinds of operating conditions. *The new plugs are being hailed everywhere as truly foul-resistant and self-cleaning!* Operators say they've *doubled and even tripled* their plug life—and still the new plugs are firing away, *troublefree.*

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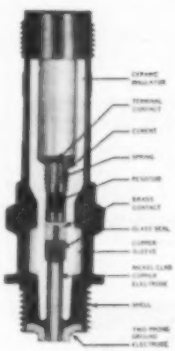

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(Continued from page 84)

these engines can offer over the piston engine.

The first of Lycoming's new series of fuel-injection powerplants, for use in utility aircraft, was first announced as having received F.A.A. certification earlier this year.

New engines, produced by the Lycoming Division of Avco Corp., are the IO-540, rated at 290 hp and first utilized with the Aero Commander 500B, and the IGSO-540, rated at 380 hp and initially mounted on the Commander 680F. In addition to these, Lycoming has a third model, a normally aspirated geared model, the GO-540, undergoing certification tests at this writing.

Use of the fuel injector, along with other design changes, allowed for a reduction of more than six inches in overall height of the IO-540 as compared to the carbureted O-540; a gain of 40 hp was realized through an advanced design, tuned-induction system coupled with fuel injection.

H. Webster Crum, vice-president and general sales manager of Lycoming, stated recently that "we have only scratched the surface of utilization of executive aircraft for business purposes . . . we must now concentrate on education of the thousands of firms that are large enough to warrant the use of aircraft but are not now doing so."

He also said that, in addition to the three aforementioned fuel-injection engines, Lycoming's 1961 powerplants will include an eight-cylinder 450- to 520-hp family of fuel-injection models. Crum noted other growth areas still to come in the piston-engine field: turbo supercharging, two-speed superchargers, tuned induction and lower speed-reduction gearing, all of which promise better performance.

In pointing up Lycoming developments, Crum voiced the feeling of most engine manufacturers in stating that, "We . . . would never undertake such extensive developments if we weren't certain the reciprocating engine was here to stay." END

Typical Business Pilot

(Continued from page 37)

Shell—is Pilots Employment Associates, with offices at Teterboro Airport. For company-clients they make confidential evaluation of pilot applicants, based upon careful psychological tests and interviews, assess each individual's strengths and weaknesses.

In a long interview with FLYING, Porter detailed the qualifications and requirements Shell demands in its flying personnel, sketched in broad terms the personal, or personality, traits sought in such employees. Here, in question-and-answer form, are some of his more pertinent replies:

Q: How many full-time pilots does Shell have?

A: In all our divisions, we have 55 full-time employees on flight status. However, counting pilots working with us under contract, or flying planes or helicopters which we have leased or rented, the number is 85.

Q: Outline Shell's basic approach to hiring a new pilot.

A: Well, first of all we look for a man who is looking to make a career—a 40-year man, if you want to put it that way—with the company. We look for safety-mindedness. And, since there is frequently intimate contact between the pilot and his passengers, both in the air and on the ground, we look for qualities of tact, reserve, discretion, honesty and personal integrity. Only after a man has met these standards, do we really begin to take a look at him as a pilot.

Briefly, our attitude is this: We are not hiring a man for the flying business; we are hiring him for the oil business.

Q: What are Shell's minimum crew qualifications?

A: Pilots for single-engine aircraft must have a F.C.C. radio operator's permit; a valid commercial pilot certificate, with appropriate ratings for the type aircraft to be flown, and a minimum of 200 hours as pilot in command; an instrument rating; and be able to pass a first-class F.A.A. physical examination once every 12 months.

Pilots for multi-engine aircraft must have a F.C.C. radio operator's permit; a valid commercial pilot certificate, an instrument rating and appropriate type rating for the aircraft to be flown. An airline transport pilot rating is considered very desirable and will normally be insisted upon; also a minimum of 1,500 flight hours as pilot in command, at least 750 hours as pilot or co-pilot in multi-engine planes since acquiring a multi-engine rating and, for initial Shell qualification, not less than 10 pilot hours in the same type of plane as that to be flown, during the preceding 90 days; and be able to pass a first-class F.A.A. physical examination at intervals not to exceed 12 months.

While the minimums here for our multi-engine captains are 1,500 hours, in actual practice I don't think we ever hired, or probably will hire, a captain with less than 5,000 hours flying time.

For copilots of multi-engine aircraft, minimums are a F.C.C. radio operator's permit; a valid commercial pilot certificate; both an instrument rating and an airframe and powerplant mechanic certificate are very desirable and will normally be insisted upon when employing a professional copilot; be able to pass first class F.A.A. physical examination at intervals not to exceed 12 months.

Q: Do you favor pilots with military backgrounds?

A: I would say no, and the reasoning is this: The average military-trained pilot is not a mechanic. Everything else being equal, because it is our company policy to start our men out as copilot-mechanics, those having a mechanic's certificate would get the nod, and most pilots, who are certificated mechanics as well, don't come to us from the military.

Our pilots usually come from the small-town airports, mainly, where they have gathered a lot of diversified flying and maintenance experience.

Q: How much time does a typical Shell pilot log each year?

A: It varies, of course, but on the aver-

(Continued on page 89)

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(Continued from page 86)

age it is about 50 hours a month, or 600 hours a year.

Q: Do you have company flight time limitations for your pilots?

A: Yes, we do. It is company policy that flight operations be scheduled so as to avoid any pilot crew member flying in excess of eight hours, or being on duty in excess of 14 hours in any 24-hour period, and no pilot crew member shall fly more than 100 hours in any 30 consecutive days, nor more than 1,000 hours in any one year.

Q: What is Shell's pilot pay scale?

A: A copilot-mechanic can range roughly between $450-a-month minimum to $750-a-month maximum, depending on various factors, including length of service and background and experience to start. In round numbers a single-engine captain's range is between $600 and $1,000 a month; a multi-engine captain's from $700 to $1,200 a month. All the regular company benefits—and they are many—retirement plans and the like, are on top of this.

Q: Where does Shell base its planes?

A: Our production and exploration department has them located at Calgary; Edmonton; Denver; Billings, Montana; Los Angeles; Midland and Houston, Tex.; and Farmington, N. M.

Our marketing division, flown by pilot-salesmen, has planes headquartered in New York, Boston, Baltimore, Atlanta, Chicago, Minneapolis, San Francisco and Indianapolis.

Q: What types of aircraft does Shell operate?

A: The 26 planes owned by Shell Aviation—and we lease or rent the others which make up our total fleet of 55 planes—are assigned to four divisions as follows:

Pipeline—one deHavilland Dove, one Luscombe, and two Cessna 172s.

Marketing—two Navions, two Bonanzas, two Twin-Bonanzas, one Dove, one Piper Apache.

Exploration and Production in the United States—two Cessna 182s, two deHavilland Beavers, one DC-3, three deHavilland Doves, one PBY.

Exploration and Production in Canada—two DC-3's, two deHavilland Otters, one Beaver.

Q: What about company operating rules and procedures?

A: As Shell's chief pilot, one of my rewarding duties is to work out operating and safety programs with our pilots. Because the aviation needs of an integrated oil company are so functionally varied and geographically separated, it is sometimes difficult to establish procedures that apply in all cases. There are two factors, though, that I am convinced are universal:

(1) Safety originates with a proper attitude on the part of the pilot, not with elaborate flight equipment.

(2) The best pilot satisfaction comes from the knowledge that he has contributed to the company effort, not just flown an aircraft. From aerial geological survey to pipeline patrol, this philosophy has paid off for Shell with a safety record of which we all are proud. Shell has received NBAA million-mile safety awards; two of our pilots have won additional million-mile certificates and several others have 500,000-mile commendations.

All our multi-engine planes having a maximum allowable gross weight of 12,500 pounds or over shall have a crew of at least a pilot and copilot at all times. Multi-engine planes with a maximum allowable gross weight of less than 12,500 pounds shall normally be operated with a pilot and copilot. However, when desirable, and considered by the pilot to meet company safety standards, and during visual flight weather, such planes may be flown without the co-pilot.

Multi-engine planes, in the less than 12,500 pound allowable gross weight category, without a separate pilot cockpit, normally are operated by only one pilot.

Q: Describe a normal week's acticities of one of your captains.

A: First of all, I don't suppose you can call any week in the oil business normal. But, for example, let's take Charlie Dillahunty, one of our pilot-captains for our exploration and production division's DC-3, with headquarters in Denver. The plane itself is kept at the Clinton Aviation hangar at Stapleton Airport. Dillahunty, however, has an office and desk in Shell's downtown Denver offices, in the Mile High Center. He keeps normal business hours, handling the paper work connected with the flying activities in his division when he isn't actually flying. His boss is the Denver division's transport manager. His copilot-mechanic works at Stapleton, doing the minor maintenance on the DC-3 and supervising the major maintenance inspections, which are done for us there, under contract, by Frontier Air Lines.

In some of our divisions, the planes are flown between various inter-company points on a regular scheduled basis. This is not the case in the wide-spread Denver Division, so Dillahunty occupies himself in the downtown office until a flight is scheduled. It can be as near as to Cheyenne, less than 100 miles away, or it can be as far east as Pittsburgh, which is included in the Denver division area. These flights are irregular. He might be flying every day for a week, then up to two weeks straight without any trip at all.

Q: Do you give preference to single or married pilots?

A: I don't think we have any set policy on this and, undoubtedly, some of the pilots, when we've hired them, have been single. However, checking over the records now, not a single one of our full-time pilot-employees is single. They're all married and "family men."

Q: How do you keep your pilots proficient?

A: They have to review continuously ground school subjects and keep abreast of new developments. They must complete a total of not less than eight hours of Link trainer or actual instrument flying and/or "hood" practice during each 60-day period. At six-month intervals, too, the pilot must secure a flight proficiency check with special emphasis on emergency procedures in the type plane he's authorized to fly. This check is given by an authorized company check pilot or an FAA flight inspector. At 12-month intervals, the pilot must complete another check—covering flight, radio navigation, airways control and communication and emergency procedures. END

North Central Airlines' Maintenance and Engineering Manager L. J. Keely (left) and Vice President R. H. Bendio, Sr., keep close check on airliner tire performance.

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Aeroflex—Andover

(Continued from page 53)

This is a lot of activity for an outfit that is less than three years old. It has been made possible by the enthusiasm of Frederick K. Hussey, president of Aeroflex, and the more-than-adequate capitalization that has been available from the resources of the parent organization.

Some years ago, Hussey became interested in the helicopter as a means of interplant transportation between Aeroflex's executive offices in New York, the Aeroflex Laboratories Division in Long Island City, the Robinson Aerial Surveys Division in Newark, N. J., and the company's Kenyon Laboratories in Connecticut.

The purchase of the first helicopter led to some charter work when the machine wasn't busy with company affairs, which in turn led to the purchase of a second copter. At about that time, testing facilities for the corporation's airborne gyro-stabilizing products became somewhat cramped. Hussey realized that a regular fixed-base operation, as part of the corporation, would provide a ready-made testing ground and would also be a general asset to Aeroflex.

A 1,200-acre tract was acquired in Andover township, and construction of the facility was begun in 1958. From the beginning, everything was done to make the Aeroflex-Andover operation completely self-sufficient. A small construction company was purchased by Aeroflex, and all construction work thereafter was done by its own organization. Huge generators were installed, making the field independent of public power. A small tower, designed by Pittsburgh Glass engineers to be as utilitarian and authentic as any control tower, was built to house the 24-hour-a-day field operators and the Unicom.

All of this was done with no fanfare and virtually no advertising. Hussey wanted to be able to offer a completed facility before he actively sought business. Despite this modest approach, the grapevine went to work and soon the air-taxi and charter business was booming and there were between 10 and 15 students receiving instruction (AAF is an FAA-approved school for fixed-wing and rotary-wing instruction, through the instrument rating). Today, the field operates a small but varied fleet of aircraft capable of a wide variety of jobs: a Cessna 310; a 175; two 150s; a Tri-Pacer; a like-new J-3; two Bell 47G-2 copters and a Hiller 12E.

The staff is headed by Henry Eagle Jr., former eastern sales manager for Hiller, who recently assumed the position of aviation director for Aeroflex. Dan Rosenson is sales manager, primarily concerned with the Hiller sales program, and Walter Smith is in charge of maintenance. Smith was helicopter maintenance supervisor for the New York City police department until his recent retirement. In addition, there is young Bob Burke, who handles fixed-wing instruction and charter work, and Ned Sheetz, erstwhile Alaskan bush pilot with extensive helicopter experience.

Dan Rosenson, the sales manager who used to be an Army copter pilot and in-

(Continued on page 92)

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NORTH AMERICAN SABRELINER

CHANCES ARE that in the not too distant future, North American Aviation will offer its six-place, twin-jet light transport, the Sabreliner, to the U. S. business aircraft market. At present, NAA has a contract for a number of these aircraft, designated T-39, to serve as navigational and all-weather trainers with the Air Force. However, the overall design and performance of the Sabreliner lends itself especially well for executive use.

North American is well aware of this but has reserved decision on the ship's entry into the civil market until October or November of this year. In the meantime, the company has been engaged in an extensive market survey of the twin-jet's potentiality as a business aircraft.

To North American's advantage is the fact that the Sabreliner has undergone full FAA certification at the time it was groomed for military duties.

Powered by two Pratt & Whitney J60 turbojets rated at 3,000 pounds of thrust each, the Sabreliner has a cruising speed of 500 mph, a range of 1,725 miles and a cruising altitude of 40,000 feet. It can cover the distance between New York and Washington in 30 minutes, between Los Angeles and San Francisco in 45 minutes and between Detroit and Denver (1,120 miles) in two hours and 24 minutes.

Backed by North American's engineering and production experience, this aircraft is sure to provide safe, fast and reliable transportation. The Sabreliner is a rugged aircraft, designed to take all the stresses encountered at 500-mph-plus speeds. It has been subjected to all rigorous tests and inspections required by the military and the FAA. Because of its jet fighter-type construction it can take more than the FAA required four-G flight loads. In addition, the Pratt & Whitney high thrust-to-low-engine-weight jet powerplants offer outstanding economy and reliability.

A question still to be answered is the demand for such an aircraft. According to North American's market analysis, the number of potential buyers for this class of airplane ranges between 80 and 125 over a five-year period. This quantity is hardly enough to support one manufacturer, even with military orders. And North American has two competitors in this field—Lockheed with its JetStar and Grumman with the Gulfstream.

Because of the considerations of a limited demand and the economics of putting a million-dollar aircraft on the civilian market, decision has been hard to make. However, in view of the Sabreliner's potentialities and the company's resolution to have the ship FAA certificated, the final decision well may be affirmative.

(Continued from page 90)

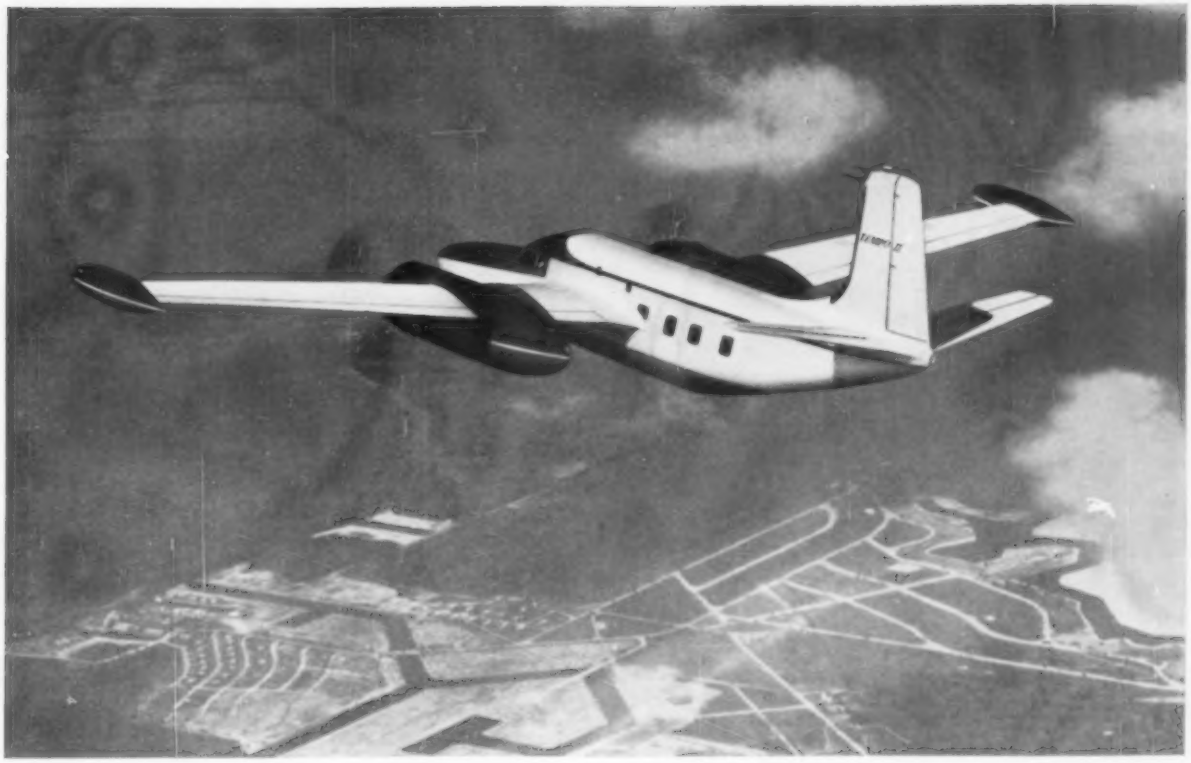
structor, is a personable young man with boundless enthusiasm for his work and for the future of the copter on the eastern seaboard.

"The helicopter largely has been ignored by private and government operators in this area," he points out. "But there is a definite place for it here, and we hope to open the gates and get things rolling."

To this end, Dan has been working closely with New Jersey state authorities, as well as local construction companies and other large industries. He has given countless demonstrations and has taken on a number of unusual charter operations that have graphically shown the benefits of the whirlybird.

Last May, for example, the New Jersey Fish and Wildlife Commission sought the use of the Aeroflex Hiller to seed a small lake with baby bass. All Jersey lakes are seeded, but this one was in a particularly inaccessible area that would have taken at least a day to reach by conventional methods. Naturally, the copter did the job in short order.

(Continued on page 94)



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(Continued from page 92)

In July, Dan flew a mission for the Pennsylvania Electric Company, laying ¾-inch, high-tension cable from the air, in the mountainous terrain west of Williamsport, Pa. The Hiller 12E laid a mile of cable—three strands of it—in about nine minutes, a job that would have consumed a full day for a ground crew.

"This was the first time, to my knowledge," says Dan, "that cable of this weight has been strung by helicopter."

Perhaps the most exciting task came last March, when Aeroflex was asked to use its Hiller to give a demonstration to Mikhail Mil, world-famous Soviet helicopter designer who was visiting the U.S. at the time. Dan flew down to Washington and spent half a day with the Russian, putting the machine through its paces. The impression made obviously was remarkable for, a few days later, Mil ordered two Hiller 12Es in the name of the Soviet government. Subsequent world events have delayed delivery of the machines, but the personal triumph scored by Dan Rosenson and the Hiller people cannot be voided.

All of this work, of course, has as its goal the sale of the helicopters in an area where they have been relatively ignored. "We're right on the verge of a break-through in this field," says Dan.

He feels that it will probably come via some New Jersey government agency, but that, once it is made, private industry in the area will realize the copter's worth and be quick to avail themselves of the machines.

"That's the biggest purpose of our Andover operation," Dan is quick to point out. "Mr. Hussey has so much faith in the future of the helicopter that he wants to push it along in this area, even if it means operating on a non-profit basis for the time being. That's why he's sinking millions into Andover."

Obviously, this isn't the sort of thing that can be done by many fixed-base operators. But it is precisely the sort of far-sighted activity that has always been the cornerstone of aviation progress. And the efficient, look-alive aspect of AAF is something that can really stand as an example to any field.

Of course, like every business, Aeroflex-Andover is out to show a profit and expand its activities. Because it is so young, officials are reluctant to quote any growth figures or cite dollar-volume for AAF to date. But they speak in unmistakably optimistic terms about the future of their operation, basing their optimism on a number of factors:

First, the fact that the helicopter has yet to come of age in their region. The potential for it is vast.

Second, there seems to be a definite need in the New York metropolitan area for a fixed-base facility that will cater to private and corporate aircraft owners who seek a really personalized service and are particular about the quality, efficiency and neatness of the service they receive.

Third, there are many large industries in northern New Jersey that have not awakened to the tremendous benefits of business flying. Aeroflex-Andover sees itself in the role of "missionary" and aviation consultant to sell aviation to these industries.

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Finally, AAF is located in a resort area, with Lake Mohawk five miles away, Lake Hopatcong within seven miles, and the famous Delaware Water Gap only 35 miles distant. Summer homes abound, which immediately suggests a market for air-taxi service to and from New York City and the major air terminals there. In addition, the Aeroflex people foresee a time, not far off, when Sussex County will become part of the spreading suburbia surrounding New York. When this day comes, the air-taxi and charter business will really boom, and there may well be a need for some variety of helicopter commuter service into the big town.

Right now, Aeroflex is content with the slow-but-steady rate of growth which it is enjoying. It can boast a remarkably complete facility for an operation its size. It offers the private pilot a beautifully kept field in fine hunting and fishing country, no landing fee, full maintenance and overhaul facilities, Unicom, and very soon will add rental cars to its list of services. And the fact that its runway lights are on every night, regardless of the weather, will be a source of comfort to many a pilot in the area.

Eventually, the runway will be extended by 3,000 feet to handle planes up to the DC-3 category, and a regular FAA tower frequency will be substituted for Unicom. But even without these refinements, Aeroflex-Andover is a welcome addition to the major fixed-base operations in the New York metropolitan area. END

Check Pilot Report — Alouette

(Continued from page 33)

is reached.) Engine power is boosted by increasing fuel flow.

Any governing rpm value between 33,000 and 34,000 may be selected by a control lever in the cockpit. When increasing collective pitch to assume hovering flight, there is a gradual increase in fuel flow and a gradual rise in TPT (tail pipe temperature). When the governor reaches its limit, and is unable further to increase fuel flow, a red warning light comes on to indicate that the engine speed will fall off with any further increase of the collective.

In taking off, the addition of power creates a different reaction from that experienced in domestic-designed helicopters. Since the blades rotate clockwise, directional control is quite similar to that of fixed-wing aircraft. As we picked up our translational lift at about 15 knots, the collective pitch was adusted to maintain a standard rate of climb of 1,000 ft./per min.

With any adjustment of the collective, the instrument to watch is the collective-pitch indicator which gives the angle, in degrees, of the amount of pitch that is being applied to the blades. This departure from the use of the tachometer as the key instrument has been accomplished through the development of an isochronous (constant speed) governor for the Alouette. This is a hydro-mechanical servo which automatically meters the fuel to the engine in direct proportion to the amount of horsepower demanded. The governor is an out-

(Continued on page 96)

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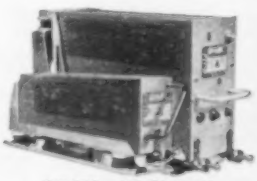

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(Continued from page 95)

standing feature since it eliminates the constant hand monitoring by the pilot in most piston-driven helicopters, required to maintain definite rotor engine rpm while increasing or decreasing blade angle.

In leveling off at 1,000 feet, the airspeed was increased for a cruise run. Unlike reciprocating engines, hourly fuel consumption decreases as power increases, so that the most economical cruising speed is close to the maximum speed for the aircraft. The higher the altitude, the faster the Alouette can be flown. The power available is the limiting factor.

As we reached 93 knots indicated the Alouette tilted slightly on its longitudinal axis. This condition was readily corrected, however, by adjusting the pneumatic-trim cylinder valve which allows the cyclic to be positioned laterally as desired. Located at the base of the instrument panel, this valve feeds engine bleed air to a bungee, and counteracts the lateral forces which may play on the cyclic.

Once stabilized in a cruise attitude, several sudden movements were made with the cyclic to disturb the line of flight and to check the reaction of the aircraft to abrupt demands on the control system. In all instances the behavior of the Alouette was more than satisfactory, affording a maximum of control in recovery from the conditions induced.

As power was reduced and a turning letdown for the initial landing was begun, control of the tail rotor was excellent. By offering no play whatever, it makes unnecessary the need to anticipate a lag in pedal pressure. For the power-on approach 50 knots airspeed was maintained until going through 100 feet; then, a gentle flare was executed, and a slight addition of power was brought in to check the rate of descent. As airspeed and altitude decreased, more power was applied to cushion the touch-down. Application of directional control, in the form of right pedal, was necessary in proportion to the amount of collective applied to counteract the rotor torque. We landed with about five knots of forward speed and the skids, attached by flexing cross tubes, brought us to a stop.

At no time was it necessary to come close to the control or power limitations that have been set on the aircraft, leaving this pilot with a very favorable impression of the Alouette's handling characteristics.

During the next circuit of the field, high-speed and slow-flight runs, and several timed turns, were initiated to gain a knowledge of the Alouette in all phases of flight. Along with the constant-speed governor, stability and the unusually low vibration level were the features which impressed me most throughout the evaluation. Once the aircraft is set up in a desired attitude, the pilot, depending on wind and turbulence, can release the controls for several minutes at a time, and maintain his flight condition. Helicopter pilots, not having benefit of automatic stabilization, can enjoy this.

In work close to the ground the Alouette, initially, seemed to require some fine directional control adjustments. This, in part, is due to the mechanical tightness of the system which was mentioned earlier. Once accustomed to the sensitivity of the pedals, hovering and sideward flight, up to about 30 knots, were but routine maneuvers. While entering the dimension of rearward flight, the cyclic moves left and to the rear; however, there is enough leeway in the controls to overcome easily this tendency. For the final phase of the evaluation several emergencies were simulated.

The onset of blade stall is quite clearly defined in the Alouette by increased vibration and feedback into the cyclic and collective. Normal recovery procedure—reducing the collective pitch and airspeed—easily brought the aircraft out of this induced condition.

REPUBLIC'S ALOUETTE II

Specifications:

Overall length (blades folded)	31 ft. 10 in.
Overall width (blades folded)	6 ft. 10 in.
Height (over main rotor head)	9 ft. 0 in.
Empty weight (dry)	1,874 lbs.
Normal gross weight	3,300 lbs.
Ground clearances:	
Main rotor	8 ft. 1 in.
Tail rotor	2 ft. 9 in.
Main rotor diameter	33 ft. 6 in.
Tail rotor diameter	5 ft. 11 in.
Normal flight rpm for main rotor	320-350 rpm
Autorotation range for main rotor	270-415 rpm
Power Unit:	
Maximum rpm	35,000
Normal rpm	33,000
Dry weight engine, including accessories	357 lbs.
Maximum permissible power	480 hp
Maximum continuous power	400 hp
Residual thrust, approximately	65 lbs.
Fuel consumption, sea level cruising condition.	38 gals. / hr.

Performance:

With 1,900 lbs. empty weight and 153 U. S. gallons of fuel, main values at maximum gross weight are as follows:

Maximum sea level speed.	92 kt.
Maximum sea level cruising speed	95 kt.
Service ceiling	10,500 ft.
Hovering ceiling out of ground effect	5,250 ft.
Hovering ceiling with ground effect	8,200 ft.
Cruising range (20 minute reserve, sea level)	273 naut. mi.
Economical cruising range	325 naut. mi.
Normal cruising endurance	3¼ hours

(For preliminary planning purposes, a sea-level fuel consumption of one-half gallon per nautical mile may be assumed.)

Autorotational performance was checked at 50 knots airspeed, a free-wheeling rotor rpm of between 360 and 365, and a rate of descent, for our weight, of approximately 1,600 feet per minute. The construction of the aluminum blades creates more than enough inertia to permit a wide rpm range to decelerate the autorotative descent, and offers handling qualities which allow a good margin of safety.

In case of engine failure, a restart can be accomplished more rapidly in flight than in piston-driven helicopters, since the shaft is not linked directly to the rotor.

(Continued on page 98)

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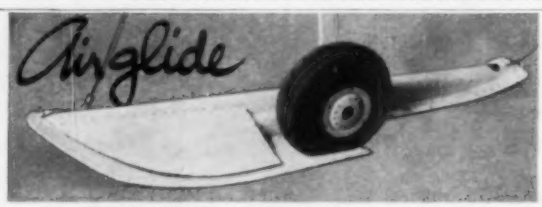

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(Continued from page 96)

Bill Littleford, the general manager of Republic's Alouette Division, told FLYING that all of the Alouettes now being sold will be fitted with the new IIC powerplant. As for the 400-hp engines that currently are in use, it is expected that their conversions will be accomplished when overhaul is due, through Republic's engine-exchange program (incorporated some time ago to enable the operator to install a zero-time engine, whenever the one in use reached its 350-hour limit).

This practice will continue, with an option for the operator to have his current engine over-hauled and converted simultaneously while using replacement, allowing almost continuous operation at minimum expense.

The inherent simplicity of the turbine has already cut maintenance time to one-third of what it has been on reciprocating engines of the same size. By more than doubling its engine life, the Alouette has reduced these costs even further.

With less maintenance, plus a wider acceptance, competition for the turbine market is increasing rapidly. Boeing, Continental, Allison, and Canadian Pratt & Whitney have all entered into the medium-horsepower turbine field (also being explored by other leading engine manufacturers). It is felt that, with the additional use of turbine-jet power, the helicopter industry can anticipate in the not too distant future an engine life comparable to that of fixed-wing aircraft.

In speaking of the other improvements recently made for the Alouette, Littleford noted that both the boost control system and the heater-defroster units have been FAA approved. The boost control is a hydraulic servo-system for the cyclic which will reduce the forces feeding back from the rotor head. The West German Army has ordered over 200 Alouette IIs with the servo and Sud has since added the system to its list of extras for commercial use.

The heater and defroster, originally designed and built to fulfill requirements of Canadian operators, is a 25,000 BTU unit.

Standard equipment for the Alouette includes metal tail-rotor blades, single flight controls, 100-ampere, 28-v dc starter-generator, navigation lights, ground-handling wheels, standard paint, cabin ventilator, covers for engine orifices and pitot tube, removable seats, and aircraft and engine instruments.

Accessories are available through Republic at additional cost; some of these include a Dare radio package ($950), dual controls ($676.50), cargo sling ($412.50), night-flying equipment ($232) plus installation, rotor brake ($709.50), flotation landing gear ($1,319.50), and a rescue litter and cargo rack ($2,596).

The sales people at Republic feel that the potential for small, low-cost models is picking up considerably.

The helicopter is definitely here to stay; not only for commercial use as a transport and business vehicle, and as a short-range work horse, but also for utilization by the small, private operator. Rapid technological development, combined with powerplant innovations, tend to make rotorcraft practical as well as economical.

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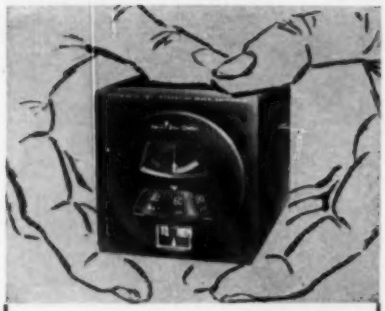

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Rotary-Wing Aircraft

(Continued from page 26)

HILLER AIRCRAFT CORP. In the first six months of this year, Hiller (which is negotiating a merger with Electric Autolite Co.) matched its commercial sales figure for all of 1959. With this impressive record coupled with late year delivery of the four-place E4, Hiller expects to double last year's sales.

The E4 is the product of a "growth program" which started with the H-23D, progressed to the 12E three-place ship, and now to the new E4.

Promoted as a "station wagon" type of business aircraft, the E4 is adaptable in basic design approach, according to Hiller, to be used as an executive model as well as a functional version for cargo and as a working personnel transport. Most unique feature of this latest member in the Hiller "family approach" is that it will be available in both a production model, and as a kit system whereby the owner of a three-place 12E may return his ship to the plant for conversion to the E4 four-place. Certified gross weight of the E4 has been increased to 2,750 pounds—it was 2,700 for the 12E.

Future design prospects fall in the turbine engine area. Powerplants now being considered by Hiller engineers are the Boeing T60, Allison T63, Canadian Pratt & Whitney PT6 and the Continental 217. New material for rotor blades as well as new blade dimensions are in the offing.

VERTOL DIVISION, BOEING AIRPLANE CO. One of the pioneers in rotorcraft development dating back to 1942, Vertol this year became a division of Boeing Airplane Company. A major portion of Vertol's current efforts are concerned with the development and production of turbine-powered, tandam-rotor helicopters for military, airlines, business and industry.

Vertol's primary craft for the business and commercial market is the Model 107-II, third version of a turbine-powered transport first produced to the requirements of the military.

Ten of the 107s now are contracted for by New York Airways with first delivery of initial five set for spring of 1961. With a gross weight of 18,450 lbs., the 107-II packs a payload of 6,836 lbs. Two General Electric T-58 shaft turbines power two counter-rotating metal rotors in tandem.

A major research program at Vertol centers on the Vertol 76, a VTOL tilt-wing.

BRANTLY HELICOPTER CORP. One helicopter a week is production schedule of the Brantly B-2, of which 24 were sold last year. This two-place rotorcraft with dual controls is powered by a 180-horsepower Lycoming VO360-AIA. Its weight empty is 980 pounds with a gross of 1,600.

Future plans call for no immediate new models. Stating his company's future plans, N. O. Brantly says, "The firm is concentrating mainly on the B-2 to make it as perfect a piece of equipment as is humanly possible." The company has firm orders for 17 B-2s at this writing.

HUGHES TOOL CO. Commercial production of model 269A has begun with first deliveries scheduled for April of 1961. By September of next year the 269As are expected to roll off at the rate of one a day, according to Hughes executives. The two-place craft is the commercial version of the Army's YHO-2HU.

REPUBLIC AVIATION CORP.'s helicopter division is marketing the French-designed turbo-powered Alouette II (for more specifics on the Alouette, see pilot evaluation on page 32). More than 20 of the models have been sold to date. The Alouette is a product of Sud Aviation. It has flown to a record 36,501 feet and carries a payload of 2,000 pounds.

Kellett KD-1A

Omega BS-12D

Kellett Aircraft Corp. and Umbaugh Aircraft Corp. are pumping along in the autogyro field. Kellett model has a three-bladed rotor with powerplant in the nose and conventional propeller for drive. The Umbaugh 18, with pusher power, recently changed configuration to V-tail design which conpany officials claim adds to stability and, because of the identical V-fins, will facilitate production at Fairchild Engine and Airplane Corp.'s Maryland plant. The Umbaugh is not yet certificated.

Other developments in the industry, while not immediately affecting commercial and business flying, still indicate a steady, growing area of usefulness for the rotary-wing aircraft.

Kaman Aircraft Corp., in addition to its models termed "Huskie" and "Seasprite," has in the advanced production stages a tilt-wing aircraft which utilizes a Grumman Goose fuselage. Gyrodyne Company of America, Raytheon Co. and Omega Aircraft each is working on specific developments in the rotorcraft field. A one-man helicopter, B-9 Little Zipster, is in the works at Bensen Aircraft Corp.

As Lee S. Johnson, General Manager of

Sikorsky and president of American Helicopter Society, stated: "We have come far in 20 years, but not far enough. By now it is obvious that the need for vertical lift aircraft is growing and will continue to grow as our great centers of population mushroom in all directions and our highways become increasingly clogged. It will increase as exploration, construction and supply are pushed into the more remote areas of the world.

"The opportunities clearly are everywhere. How well we take advantage of them will depend upon our own energies and skills, how willing we are to take the inevitable risks and with what high enthusiasm we continue to tell the story of the helicopter and how it can enhance our national security and economic well-being."

With the moves to turbine power, with the experimental research in new propulsion techniques such as tip burners, tip rockets and nuclear energy, and with continued work in the VTOL and STOL fields, the rotary-wing aircraft industry is gaining an important place in business and commercial flying. The pipe dreams have been replaced by performance. END

Financing Your Airplane

(Continued from page 39)

accounting method—whether straight line, sum of digits or declining balance.

Such advice, whether given directly to the customer by bank or finance company or via the aircraft dealer, is becoming more and more important in the expanding area of business aircraft sales. It also is proving very helpful in personal aircraft sales where accounting methods and tax advantages may not be so significant but where readily available financing facts are a psychological sales aid.

For instance, Bill Donahue, manager of DuPage County Airport just west of Chicago and for many years a very active Cessna dealer, remarked, "A lot of people feel embarrassed to ask about financing." Being able to offer immediate and reliable details on several financing plans and to secure 24- to 48-hour service from a bank or finance company in clearing the customer's credit application, undoubtedly is a major factor in the growth over the past year or two of aircraft sales, both new and used.

Often a customer will not want to finance through his own bank, particularly if the plane is primarily for pleasure with only an occasional business utility. Or perhaps a customer already has extended his line of credit as far as he wishes to go at his own bank. A dealer then must be able to offer an alternative.

A major aid in this has been establishment by several manufacturers of their own subsidiary finance companies. Of the big three in unit sales volume—Beech, Cessna and Piper—Beech and Cessna both have finance companies and Piper long has had a special finance plan with Commercial Credit of Maryland, Inc.

Beech Acceptance Corporation, in addition to a flexible program of down payments and terms, offers three plans tailored to the three accounting methods—straight

(Continued on page 102)

Painting by Douglas Ettridge

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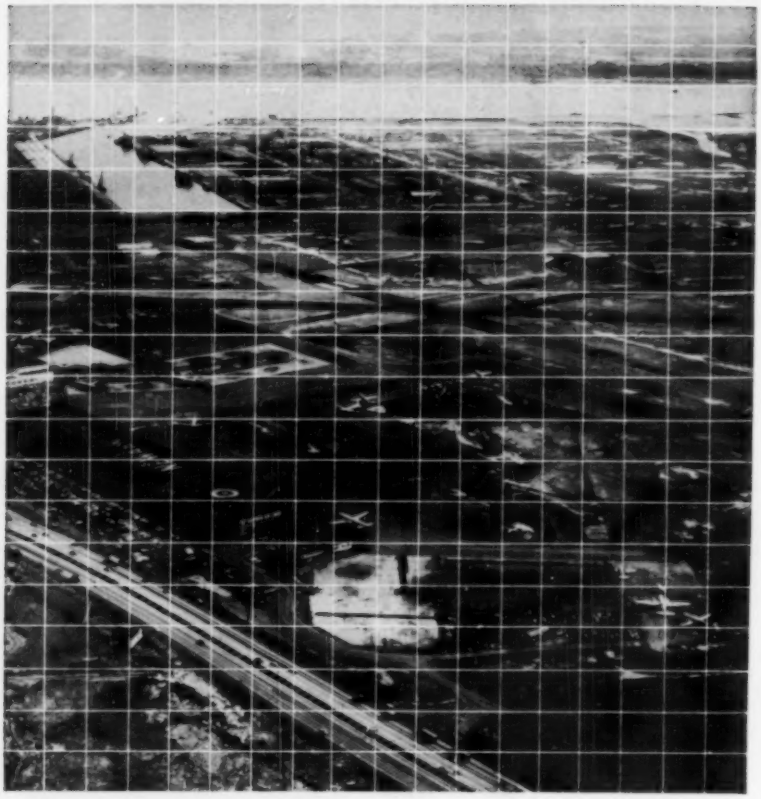

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(Continued from page 101)

line, sum of digits and declining balance—with down payments 20 to 25 per cent and terms three to four years, depending upon method chosen. Cessna's NAFCO—National Aero Finance Company—compares favorably with average rates and terms available throughout the country and, like most manufacturing company finance plans, also offers "floor plan" financing of demonstrators and used aircraft for franchised Cessna dealers and distributors.

Used aircraft sales present the biggest problems in the finance market, are responsible for most repossessions. Without exception, every bank official interviewed stated emphatically that they do not like to take aircraft paper in the small loan, small-used-plane market. Basically, that means the $500 to about $2,000 loan to an individual for a pretty badly beaten-up old plane. They do take some, usually to help a dealer who must get rid of the aircraft he has taken in trade and is assuming recourse responsibility. Or perhaps the dealer feels that the customer ultimately may buy a new or better used plane and wants to help him take his first step in aircraft ownership. But the record of such contracts is not a happy one. Too often the borrower really can not afford the plane. Or perhaps he can afford the plane but not the overhaul, repair, maintenance and insurance it demands.

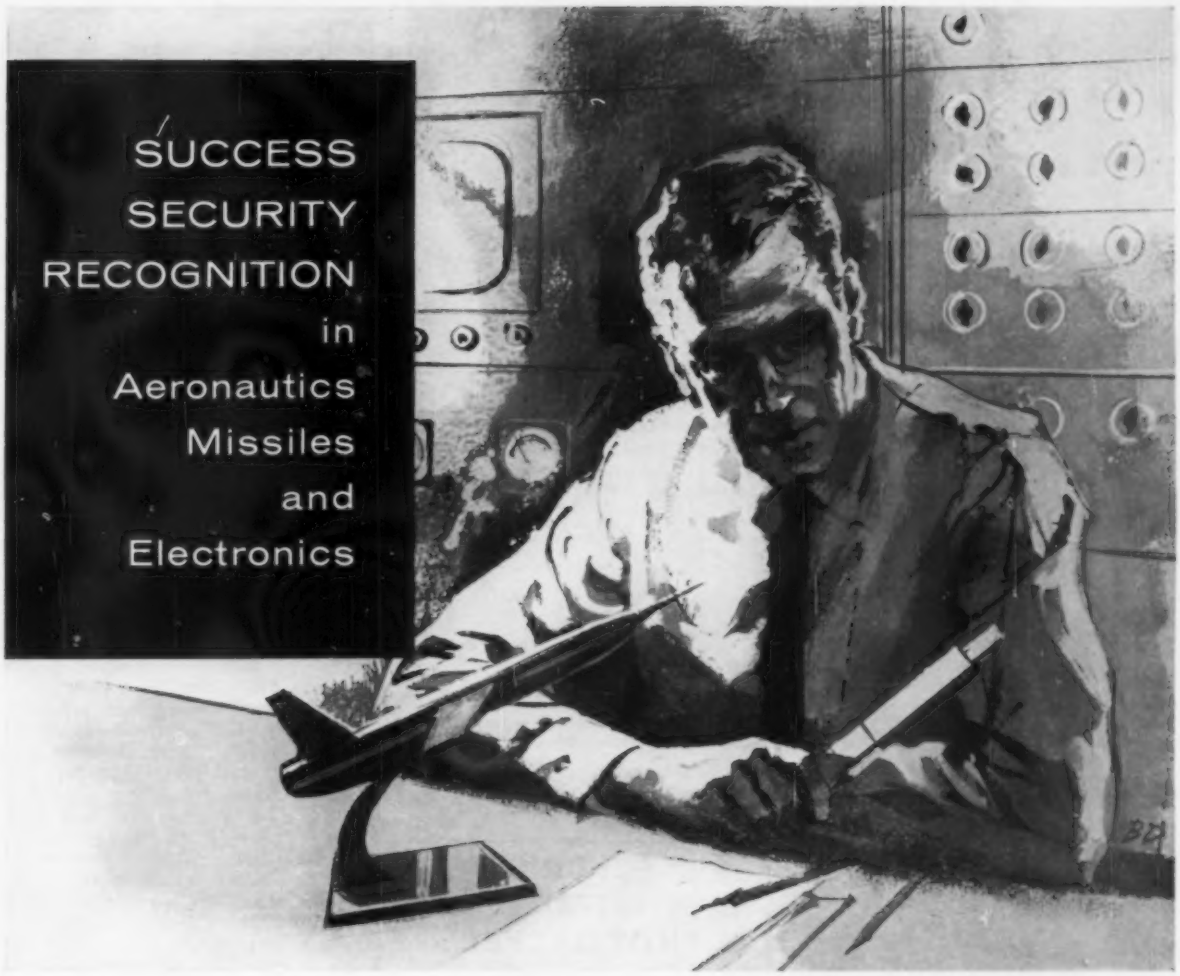
Insurance is one factor some new buyers tend to overlook, but all finance arrangements require full hull coverage. In some cases, where perhaps the buyer is a new pilot or his record is poor, the insurance rate may cost almost as much as the ancient craft he is buying.

And of course, it is in the area of the comparatively inexpensive, older lightplanes where would-be purchasers too often can not come up with adequate credit ratings. Banks and finance companies are in the business of selling money. They take a risk in exchange for a rate of interest or finance charge. If the credit risk is too great, they usually will not take the paper. The buyer then must try elsewhere and sometimes ends up paying an exorbitant rate to the occasional finance company willing to take the risk.

Buying a new plane and hoping for a good portion of the down payment to be covered by the value of your trade-in, you may find a dealer checking your asking price against a small, blue book. This "Used Aircraft Price Guide," published since 1948 by Interstate Aircredit Corp., of Minneapolis, well may determine what you will get. Having a very closely controlled circulation, it goes only to manufacturers, dealers and distributors, banks, finance companies, insurance companies, tax assessors, state and federal agencies.

Compiled from monthly reports sent in by dealers listing sales of all single and light twin-engine aircraft, including their optional equipment, an average monthly price received for each model is arrived at by a complicated but evidently very fair mathematical formula. Distributed monthly, the book gives original list price (standard equipment) of all models since 1945

(Continued on page 104)



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(Continued from page 102)

and their current national average selling price; engine identification; and original list and current selling price of most radios and major optional equipment.

While many dealers have much of this information at their finger tips, they often refer to the blue book for current price on a rare model or piece of equipment. Banks and finance companies find the book a good basic guide since there seems to be no formula for true aircraft depreciation, particularly on some models which are very slow to depreciate after the first two or three years. And airplanes never seem to die. Of the present 70,000 licensed aircraft in the country, about 35,000 are more than ten years old.

Although the turn-over in used aircraft brings the annual unit volume of sales up considerably from the 7,689 units produced in '59, it is still rather surprising to find an almost casual acceptance of aircraft paper among so many financial institutions. Visiting my own New York bank during my survey, I was amazed to find it has an aviation division, complete with two vice-presidents, in its industrial loan department. This special division makes large loans to airlines and manufacturers. Loans for private or business aircraft go through the regular retail loan channels where an application for an Apache or 310 takes its turn in the pile with applications for housing improvements, autos and washers.

Naturally, most financial outfits would rather deal with loans for an Aero Commander 720 or a Twin-Beech in the $100,000 category than handle many smaller loans. But volume is found primarily in the single-engine class, both new and used. And it's adequate volume at least for some of the largest and most reliable finance companies to be getting into the market full tilt, with limits, of course, in minimum size of loans they will make.

For instance, I found so many dealers working with CIT—Commercial Investment Trust—that further investigation was called for. Actively in the aircraft loan field with all 19 of their branches throughout the country, CIT seems to be making considerable headway in lining up dealer and distributor arrangements. They offer competitive rates and attractive terms, often without recourse to the dealer, and a single finance charge. New single-engine planes can be financed on terms up to four years, twin-engine to five. Maximum for used aircraft is 36 months. If customers prefer, payments can be geared to one of the faster depreciation schedules in CIT's PAYD (Pay-As-You-Depreciate). And CIT also can purchase most kind of leases arranged between the dealer and user.

This latter area of financing, the lease plan, is a subject unto itself. Most banks do not like leases, though some will finance them for regular customers. Practically all manufacturers offer some form of lease arrangement and many large distributors do a great deal of leasing to their customers. Actually, it is very difficult to track down any overall figures on leasing. Certainly many business "owners" of aircraft in reality lease their planes for tax and accounting reasons. At one airport long

(Continued on page 106)

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This airplane is actually a flying classroom. The course taught in it is Air Navigation, under *real* conditions. The students are young men who have been selected as possible future leaders of the Aerospace Team. Graduation after 32 weeks of training will win each of the students the honored silver wings of an Air Force Navigator and an Officer's Commission.

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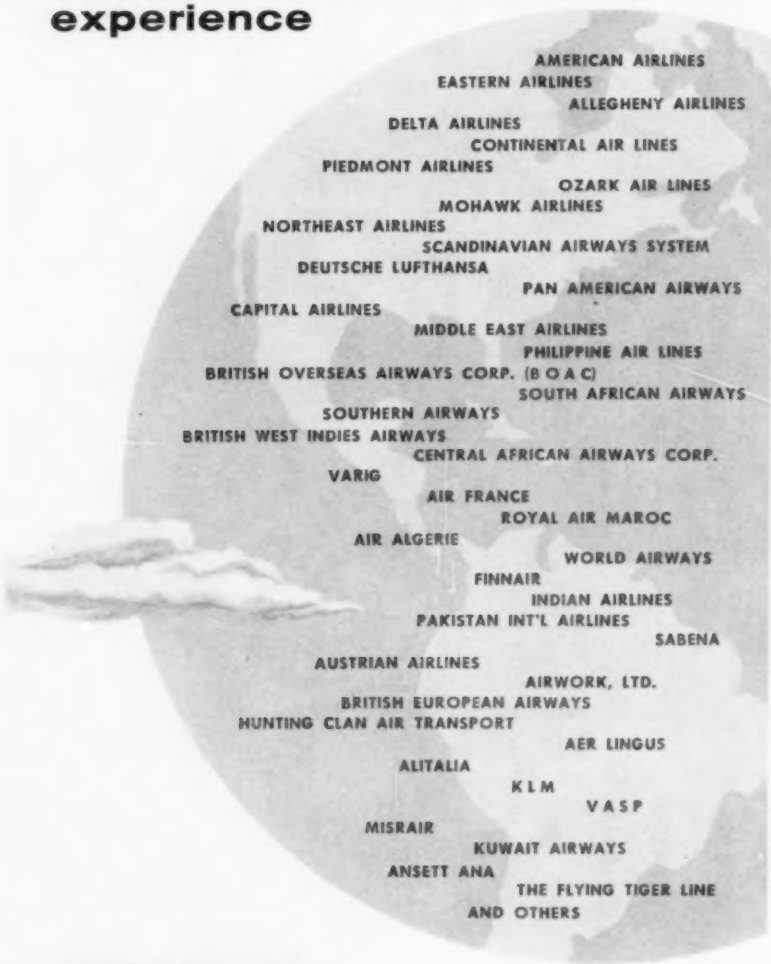

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SPECIFICATIONS: Lightening fast 5-shot bolt action, box magazine fed, 22" bbl., sharp, accurate bores, rear sight adjustable for elevation and windage, all milled parts. $75 value.

ACCESSORIES AND AMMO: .308 softpoint hunting ammo: 20 rds., $2.95. Leather sling, $2. Cleaning rod, $1. Gun case, heavy duty, $2. Cleaning kit, (patches, bore cleaner, gun oil) 75c.

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MARTIN B. RETTING, INC.
11029 Washington Blvd., Culver City 37, Calif.

(Continued from page 104)

noted for basing one of the largest multi-engine corporate fleets, I found that the corporations formed their own leasing company to purchase planes and lease them back to the individual companies.

However, whether leased or purchased, financing enters the deal somewhere along the line with almost all aircraft transactions. In an effort to secure aircraft financing information for their members, the National Aero Club, a nonprofit service organization for pilots and aircraft owners with headquarters at Ann Arbor, Mich., recently ran a mail questionnaire survey of 109 banks and finance companies chosen at random from a national list of thousands. Replies were received from 56, a very good return as such surveys go. Analysis shows more than half are very active in the field of aircraft financing; others will take aircraft paper for good customers; many are studying the field carefully.

Rates reported range from four-and-one-half to 10 per cent, with 20 to 33⅓ per cent down payment, for periods of one to five years. Rates and terms generally depend on whether the plane is new or used, single or multi-engine, and the borrower's credit rating. Average: six per cent for two to three years, with 25 to 33⅓ per cent down. All require full hull insurance, most with breach of warranty clause; about a third take contracts on a nonrecourse basis. Several made the same comment on their aircraft paper experience: "Very satisfactory."

Where do you find a bank active in aircraft financing? After visiting 39 airports to talk to dealers and distributors, I found a simple formula: if you know aviation at all well, you can tell when an airport has an aggressive, successful aircraft sales organization just by looking at it. Where you find such an outfit, you'll find a city with at least one bank that actively solicits aircraft paper.

If you have tried your own bank hoping for a personal loan at six per cent simple interest based on your credit rating (the best possible kind of deal you can make for yourself), and find they just can't see why you must have an airplane, ask your aircraft dealer for the names of other local or neighboring town banks who may be going quietly after aircraft paper in their installment loan departments, or for finance companies that deal in the field.

Remember, though, that this will not be true, simple interest. According to a recent report by the California Consumer Counsel, when an installment loan rate is six per cent, you are actually paying 10.9 per cent annual true interest. Some states require lenders to give borrowers a complete analysis of all rates and terms so they will know exactly what they are paying.

And remember above all, your credit rating will determine in great measure the rate you have to pay. A very good step in the right direction is to get your bank to help you draw up a statement of your credit position. For a simple check you can make yourself, there are three "Cs" to consider: Credit—your reputation in meeting previous obligations; Capacity—your earning power; Collateral—the ultimate source of recovery if you default. END

The Pressure Is On

(Continued from page 56)

first ten minutes; at 40,000 feet, within five minutes, one in every five subjects will have the "bends" or the "chokes"; at 35,000 feet, after two hours, half the passengers will have the symptoms. Time is of the essence, though modern jet aircraft can descend rapidly within a safe two minutes from 35,000 feet to 16,000 feet, where gas bubbles can no longer be formed.

Above all, the continued supply of adequate oxygen is paramount.

The modern jet passenger reclines comfortably in the large passenger cabin at sea level pressure, as the aircraft climbs swiftly to 22,500 feet. At 40,000 feet altitude, he enjoys a comfortable cabin pressure equal to 7,500 feet. If he wonders uneasily about what it is like to lose this helpful pressure abruptly, he must ask the Air Force bomber pilot whose aircraft, pressurized to 10,000 feet, lost the bombardier's window canopy at 41,000 feet.

The pilot heard a loud booming explosion type of noise, felt a marked rapid drop of air temperature, and was partly enveloped in condensed water vapor which obscured his glasses, filled the flight deck up to a level above the instrument panel, and which he at first mistook for smoke. The fog disappeared within seconds. The bomber, pitched and buffeted by the change of air flow, lost little equipment and none of the crew through the opening. The pilot felt a sudden rush of expanded air from his lungs out through his nose and mouth, partly lifting his oxygen mask from his face; but, quickly realizing the situation, he reseated his mask more securely and turned the selector to pressure position. He became dizzy for five or six seconds but recovered promptly, immediately began a descent from altitude and assisted other crew members with their oxygen equipment.

Several of the unconscious crew struggled a few seconds and tried to tear off their masks until consciousness returned. The thin air and noise made speech difficult and partly unintelligible over the interphone communication system.

All crew members revived. The pilot felt no abdominal discomforts or other ill effects, though several of the crew reported pain in the ears or sinuses during the rapid descent, especially as the ship descended below 20,000 feet to 15,000 feet. No "bends" occurred during the remainder of the flight, nor during the six hours thereafter, a period when the symptoms may suddenly occur in some individuals.

Though no major rapid or explosive decompressions have occurred in commercial jet operations since their inauguration in the United States in October, 1958 to the present writing, difficulties with valves in the pressure systems have occurred at times. Jet air crews are given training in procedures to handle loss of cabin pressure; each crew member has oxygen immediately available at all times. Passenger oxygen equipment begins to function when the cabin altitude reaches 14,000 feet, automatically projecting the mask in front of the passenger and allowing oxygen to flow immediately as he applies the mask to his face. Descent from altitude must be begun promptly; consciousness, if lost because of

(Continued on page 108)

What are they saying about the BELLANCA 260?

From both owners and check pilot reports have come countless compliments on the 260. Here are a few *actual quotes:*

". . . gear comes up smooth and fast . . . 3.9 seconds."

". . . amazing thing! It flies well at any speed . . . abrupt power changes barely disturb its symmetry of flight. It flies well at 200 mph, 160, 140, 120, 80 mph."

". . . it will let down at 70 mph at a rate of descent around 1000 fpm . . . the pilot can sit there with hands and feet off the controls."

"Its wide speed range, gentle flight characteristics and excellent take-off and climb performance, offers the business pilot an aircraft which can get in and out of most any field, and carry him to his destination at 200 mph."

". . . contour, foam cushioned seats are unbelievably comfortable."

"(Wing) A tougher and more durable finish and structure is not to be had."

". . . panel is a joy and delight. . . . an excellent job of functionally-designed panel."

". . . and then you go up as if off the end of a springboard, 1750 fpm."

"It flies nicely with ailerons only and equally as well with rudder only."

". . . good airplane in wind and it rides well in turbulence."

". . . absolutely essential to our business."

". . . more airplane for the price than I've ever seen or flown."

". . . smoother and quieter than I ever imagined."

The *real* way to tell is to fly the 260. You can —today. Call your dealer and see for yourself.

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ATTENTION
Week-end Pilots:

Here's a gold-mine of information, facts, hints and tips to help you get the most out of your plane and pilot's license.

Frank Kingston Smith (AOPA 124393) is a week-end pilot. He started out with a Cessna 140 and an auto map of his home state. Two years and hundreds of flying hours later he was piloting his whole family in a Cessna 172 with flight plans that covered two continents.

In a breezy, amusing account of his adventures in the air, Mr. Smith passes on all that he has learned about flying. You will find his book full of wonderful new ideas and suggestions that will add immeasurable enjoyment to your own hours of flight time.

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(Continued from 107)

faulty use of oxygen equipment, is usually regained somewhere between 24,000 and 15,000 feet.

Ill persons, with certain type of heart and lung diseases, or with anemias, of course would not withstand abrupt loss of cabin pressure as did the healthy Air Force bomber crew. Persons with any type of illness should consult their private physician concerning the advisability of air travel, which in the overwhelming majority of instances is well tolerated, more comfortable, and more convenient than other modes of travel. A person who is ill but able to travel can do so in any aircraft at any altitude, if sea level pressure is maintained in the cabin; and many ill persons tolerate the 7,500-foot cabin pressure without difficulty.

All hazards of flying cannot be eliminated entirely; but in the modern aircraft, the "pressure" is off, when, indeed, the pressure is on. END

How To Sell An Airplane

(Continued from page 35)

FLYING's inquisition covered buyers and users of small airplanes as well as the large half-million-dollar-plus transports. In the smaller categories, the story is quite different.

The company president and pilot is very often the same man. He is a flying enthusiast and one keenly interested in making the plane prove its value.

This two-hatted customer views the question quite differently from the big-plane owner.

His technical knowledge varies so much that patterns in attitude and tastes are hard to establish. He is influenced by color, interior plush, smart lines, performance and, of course, price.

Single-engined plane users for the most part talk more about speed, are less concerned with twin-engined reliability, and place higher values on the prestige factor of plane ownership. Although it is hard to pin down, they agree that too many plane salesmen they have known spend too much time boasting of their prowess as pilots instead of demonstrating the plane. They, too, agree that some pilots upset the prospect by "being too nervous" while the prospect flies during sales flights.

A Beechcraft owner-company president from the midwest had this to say on the topic: "The good salesman-pilot is a rarity. I've been influenced more by friends letting me fly their planes than I have by sales demonstrations. With but one exception, the man who sold me this airplane, every sales pilot I've known is so tense during demonstration flights that I can't wait to give him back the controls. The salesman-pilot sold me this plane by giving me a brief check flight, then telling me to go fly it myself. He said I was a better pilot than he was.

"Now how can you beat that kind of salesmanship?"

A sales executive, flying his own light twin, summed up the story as we discussed the problem in the lobby of a Houston, Tex. hotel. He said, "Plane makers spend thousands of dollars preparing market stud-

ies, sales analyses of their products compared to the competition. They spend additional thousands planning sales organizations and dealer-distributor systems. But, until recently, hardly a cent ever went for field sales training of personnel.

"I've watched the business long enough to know that much improvement has taken place over the last five years but, compared to my sales-engineering work, business plane sales has a long, long way to go before the real potential is tapped by men who know how to sell—and by men who receive a fair reward for doing it."

It is evident that all of the science and technical advances made by the aircraft industry have produced a better plane, increased reliability and utility, and a product that's safer and easier for men to fly. All of this means larger market and greater sales opportunities. Many manufacturers have strengthened their efforts in this direction by hiring proven sales executives, many of whom do not fly. Some have hired men who developed sales capabilities in the automotive marketing field. The matter of making them pilots is relatively easy—they just step out of the office door.

These trends are all in the right direction but the impact is yet to be felt on the airport ramp where the selling is done. Here there is no substitute for good salesmen.

This reporter has devoted more than 20 years to aviation promotion and sales related work. During all of this time the industry's great scientific advances cannot be questioned. The airplane has become so essential to the heartbeat of the world that the most ardent pessimist cannot fail to be optimistic. But, in these years of great progress, the importance of the salesman has been smothered by emphasis upon science and engineering.

In pursuit of this story, through interviews with business plane users and pilots at Minneapolis, Kansas City, Wichita, Dallas, Houston, Los Angeles, New York, Washington (D.C.) and El Paso, it is evident that salesmen are about to stage a comeback in aviation.

The leaders interviewed agree that the art of selling may assume equal emphasis and status with scientists, engineers and production experts. These same "buyers" believe that business aviation has just about developed the full potential of the air-orientated company plane operators. They point out that the broader, tougher market must be "sold," that skilled salesmen must get into the board rooms and the president's office; that they must reach and talk with executives on their own level.

This hardening but profitable market will demand greater synchronization between sales and management, more effective use of sales aids, better merchandising, and more careful study of potential customer personality. Knitting all of these many services and facts together must be flexible, high-level salesmanship—nimble, well-disciplined disciples who have mastered the art of influencing "buyers."

Thus, in this complex, technically charged climate of the Sixties, lies a challenge and a worthy target for salesmanship to show its mettle—to make business aviation the biggest forward step in business of the decade. END

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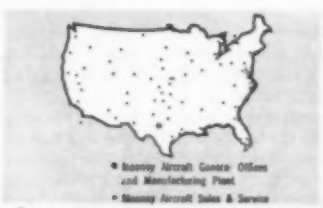

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"I'm confident that Mooney has a great future. An outstanding product backed up with progressive plans ahead is the reason I've become a Mooney distributor." WALTER J. IMBRULIA, Hayward Airport, Hayward, Calif.

"I swapped my 225 h.p. plane for the 180 h.p. Mooney Mark 20A and I save enough on gasoline alone to pay for all my maintenance." DR. MAURICE A. LEMMONS, O.D.; Ozona, Texas.

"Modern styling with smart, clean design makes the Mooney a plane of beauty and prestige. I like its speed and maneuverability." CHARLES C. WALLACE, 3809 Montrose Drive, N. Chevy Chase, Md.

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HANGAR FLYING

AFB TO THE RESCUE

CIVILIAN PILOTS have had a bogey implanted in their minds ever since they were students: Air Force bases are taboo, the never-never land for non-military pilots. This is not so. At least, not if you are in trouble. The Air Force base is then like money from home. Here's what happened to me.

I had come down the Victor 5 Airway from Bowling Green, Ky. in my newly overhauled Ercoupe, beating the sunset into Nashville, Tenn. About 20 miles out, I had switched from the Nashville omni to the Berry Field tower frequency.

Pulling on carburetor heat and throttling back, I started my let-down from 6,000 feet. After losing some altitude, I tried to clear my engine, but the throttle refused to budge. I was getting around 1,800 rpm and the old Ercoupe just could not hold altitude at this power setting. By closing the carburetor heat, the engine picked up some additional power, but the plane was still losing altitude.

I called Berry Field and told them of my predicament. The tower advised that traffic was thick over Berry and asked whether I could make it to Cumberland or Cornelia Fort, two other airports in the Nashville area. As I had already passed these fields, I told them that I was loathe to turn back and risk a dead-stick over the city of Nashville.

While hanging the mike back on the hook, I looked out over the left wing and there, just beyond its tip, was one of the loveliest sights I have ever seen. Miles of hard-surfaces runways.

A glance at the sectional map confirmed that it was Sewart Air Force Base. I still had a couple of thousand feet but decided that this was the place for me. Since I could not contact Sewart tower, I called Berry and had them pass the word along to Sewart that they were about to receive a visitor. Berry came back with the good news that I was cleared to any runway. I did a slow 360 over the field to kill off altitude, lined up on final, and as soon as it looked that I had it made, cut the switch and coasted in over the fence.

As soon as the Ercoupe came to a stop I was met by everyone on the base, or so it seemed. The Air Police in a weapon-carrier drove me to the operations building. There I was met by the base security officer who handed me a stack of forms to fill out and sign. While this was going on, the ground crew had found that my throttle linkage had broken and become jammed.

The base C.O. also was going over my plane with a fine-tooth comb and even checked the charts and logs. Satisfied that everything was in order he offered to drive me into town to spend the night. Everybody on the base seemed to be eager to help me. I have never been treated with more hospitality. By then a crew chief reported that my plane was ready to go, so I took off.

Now don't get the idea that you can load your girl friend into the old Cub and drop into a SAC base to show her the pretty bombers. You will find cold eyes looking at you down the barrel of a submachine gun. But if you are genuinely in trouble, do not hesitate to use Air Force assistance. Long runways are better for landing than boondocks.

JOHN W. WYATT

Carpentersville, Ill.

GROUND RUN-UPS CONSUME GAS

IT STARTED OUT as a fine CAVU Sunday, but here we were, my wife and I, 116 miles from home, with a stuck valve in our Champion's engine. All efforts to break it loose, by mixing solvent with gas and oil or squirting it into the intake manifold, proved futile.

I finally gave up and called the home field as there was not a mechanic available within 50 miles.

Lefty McGran, a friend and owner of the flying school where I fly, came up in his Stinson 150 with the necessary tools. It took him several hours, but he cleared the trouble and gave the Champ a 10-minute hop.

I took off alone at 6:30 pm, leaving my wife to ride back in the Stinson, climbed to 2,000 feet and headed south. I knew the area like the back of my hand; nevertheless, being a rated navigator, I had laid out the course on a sectional map. Halfway home it became evident, even without a computer, that my ground speed was low, about 60 mph.

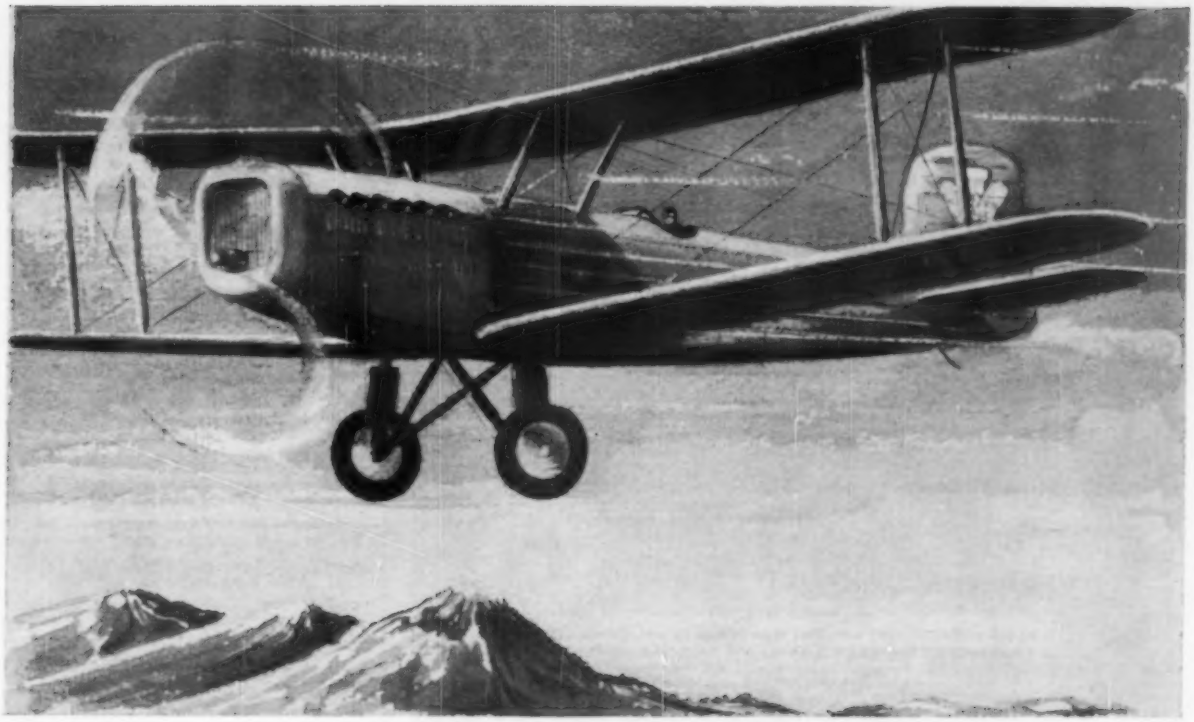
Due to an overcast, darkness set in an hour earlier and I had yet to make a night landing and, besides, the home field was unlighted. Simultaneously, I made the unpleasant discovery that my fuel supply was much lower than it should have been. The indicator showed zero but would still bob when I shook the stick. Then it stopped bobbing entirely.

By then it was too dark to read the map but I knew exactly where I was and had an emergency field picked at all times, so there was no problem. Finally, I spotted the big, white farm house just north of the field and started a straight-in approach, letting down at reduced power. I was home. . . .

It had taken me two full hours to cover 116 miles and although I had topped off the tank at the time the engine acted up, I forgot to take into consideration the ground run-ups and the short test hop which used considerable fuel, and neglected to retop the tank prior to my departure. This oversight might easily have resulted in a forced landing.

ARLAND L. SHIEL

Columbus, Ohio.



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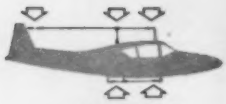

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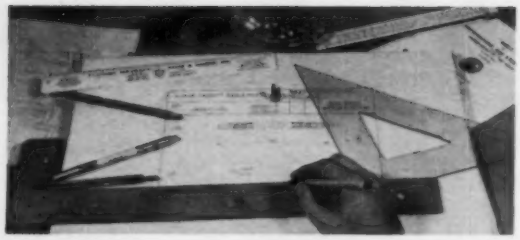

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(Continued from page 58)

well as pilots. One of the main features preferred by them besides the price and easy maintenance advantages is the mixing quality—being able to place accent upon radio or electronics or both and thus tailor the trainer to the mission and pocketbook limitations.

The trainer is designed to simulate flight between sea level and 8,800 feet while operating within the speed range of 85 to 220 mph.

The 60M or mechanical flight trainer, expected to market for $1,990 f.o.b. Binghamton, is the basic flight trainer unit and can be used for high volume on-ground instruction of basic flight principles before the student steps into an airplane. It is a good practice instrument for all phases of initial training and afterwards because it provides the standard group of instruments which are fast becoming standard in every aircraft: gyro or artificial horizon, directional gyro, bank-and-turn indicator, airspeed indicator, altimeter, vertical speed indicator, clock and tachometer.

Model 60R (including M and R features) sells for approximately $8,900.

Model 60E is the first electronic instrument and navigation trainer designed and built specifically for general aviation. Including an analog computer, it costs $12,000. Combining the E and the R brings the price to $19,500.

The radio flight trainer, Model 60R, has radio units detachable from the instructor unit. It is capable of providing 19 individual radio facilities. Included are four omnirange or ILS stations, one low-frequency radio range station with Z marker, three nondirectional beacons, eight fan markers and inner and outer fan markers.

The fan markers may be placed on radio range legs as the instructor desires. One outer marker and middle marker may be positioned on the ILS glide slope path. Each radio facility has its own code transmitter.

Cockpit instrumentation servicing radio aids are: a VHF navigation receiver and tuning controls for VOR or ILS stations; low-frequency receiver and tuning controls for radio range and nondirectional beacon; an ADF compass; a Z marker and marker beacon receiver. A ground position recorder, mounted on the radio-aid cabinet, plots the course over the ground and prepares a record of each flight.

Link is confident that its new trainers will be of particular interest to the more than 800 FAA-approved flight schools, state departments of aeronautics and various segments of military and government aviation.

However, one of the most responsive groups of pilots is the business-plane group. Business pilots long have sought low cost, proficient flight simulators priced for home-base location. Many have already installed the World War II Link trainers but these units have proved too costly to maintain—spare parts and the lack of competent service personnel render them unreliable.

The 60 series and the radio aids unit operate from regular 110-volt household

circuits and require less than 15 amps. of power.

When asked about per-hour costs, including maintenance, depreciation, etc., Link reports the average hourly rate in the midwest area should be about $5 plus instructor time. Some operators may find this price can be improved by multiple unit operations.

Until the market study has been completed, Link is accepting orders but actual production will await final assessment of the sales potential before production go-ahead will be given. The company also plans design improvement to come from the six-month's market and operational maintenance study.

At the moment, business and private pilots are having the opportunity to register their reaction to the new trainers. Link's trailer truck, rigged with Model 60 units, has been touring the U. S. since late August. What they think will have important bearing upon the company's decision.

One fact is apparent already. Every T-Hangar won't come equipped with a flight trainer but for the first time in aviation's history they're closer to the average pilot's pocketbook. END

I Learned About Flying

(Continued from page 68)

I should have filled the nose tank and kept a reserve amount in the wing. This would have brought our "sick" center of gravity forward, greatly improving stall-spin characteristics. Not only that, but my phony plan had cancelled out a safety factor of the multi-tank system. Should I have encountered water or dirt in my wing tank, I would have had nothing in my nose tank to carry me home. When weight considerations require a reduced fuel load, I now split it up among all available tanks, even if this does require a little draining here and there and some mental figuring. But I am digressing.

It was a beautiful morning for anything, flying especially. The red rim of the sunrise was just beginning to show itself through a slight morning mist, setting the snowbanks afire with sparkling colors of silver, gold, and crimson. It felt good talking with the tower operator. Even the radio seemed more crystal clear than ever. A pleasure to communicate! We received clearance, swung around, and roared away in a cloud of snow.

I was thinking already of my first class that morning, when the most dreadful silence occurred. At precisely the critical moment, after taking up 4,000 feet of runway to gain 150 feet of altitude, the engine had died as quickly as if it had disappeared altogether. A terrible sensation came over me. My heart clawed its way up my windpipe, precluding all possibility of speech, as if talking would have done any good!

As usual in such circumstances, my passengers, all being non-pilots, were very calm at first, not having the slightest idea of what was going on. One look at me, though, and the secret was out. This was not standard operating procedure!

Luckily, I had had enough hours in a Clipper to be familiar with procedures

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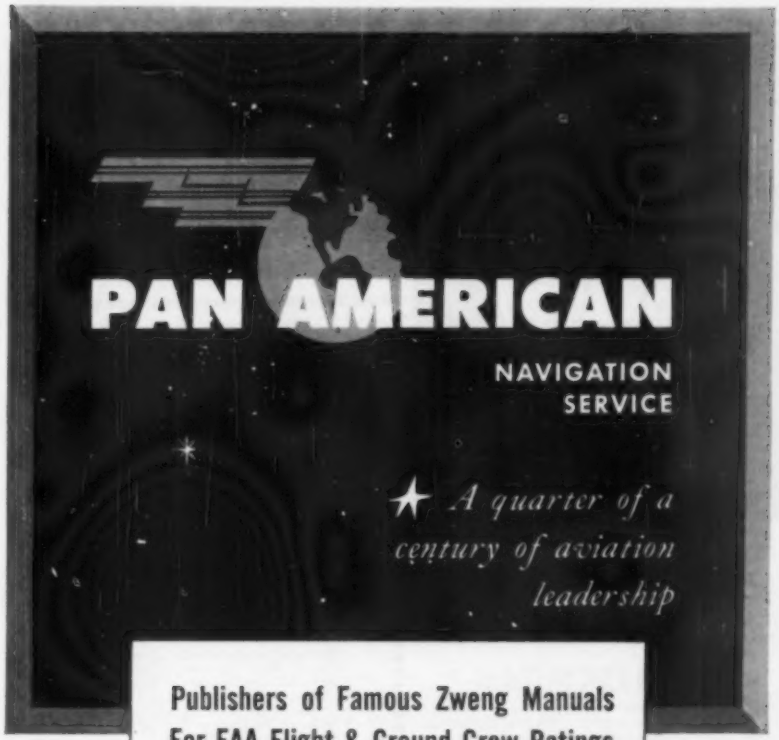

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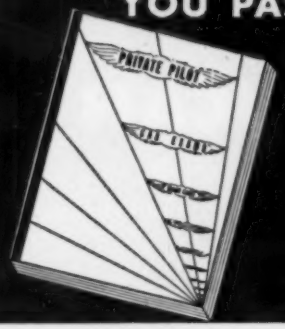

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under most circumstances and, as I subconsciously was reaching down under the instrument panel to turn the gas selector valve, I was consciously damning myself for not remembering to switch tanks immediately prior to takeoff as I had planned, and at the same time, was trying to assure myself that this *must* be the reason that something went wrong. But I never will forget the sight I saw.

Bending over to reach the selector valve, I could see out of the corner of my eye the shoulders of my front seat passenger. As the plane began mushing in a sickening descent, all of my passengers' shoulders were hunching upward toward their ears. They were trying to maintain body altitude regardless of what the plane was doing, somewhat akin to a drowning person desperately climbing on top of his would-be rescuer in an attempt to get more air. Their stares were fixed upon a hardwood forest into which even a non-pilot could tell our glide path extended. But this was our day. No air locks or sheared selector valve pins for us!

I was busy looking for the least menacing and most resilient-looking trees when that life-saving liquid rushed down from the wing and restored full vigor to our silent engine. In a situation where every second counted, things had gone off smoothly. As I gradually pulled up, and the shoulders of my passengers sank back to their accustomed levels, I thought, "Good old simple gravity feed, it has its advantages!" Once again, we were on our way home and made it without further incident.

This incident illustrates the basic cause for practically all "wheels up" landings, cases of gas starvation on takeoff, along with a few other glaring examples of that familiar term, pilot error. Somebody relied upon their memory. Never do it! It will let you down at the most embarrassing moment. Have you ever begun to introduce some people and drawn a complete mental blank on your best friend's name? It is for this reason that all checklists should be sight read, for attempted memorization defeats the purpose of a checklist in the first place.

In my case, I thought I was really playing it safe. I checked the gas visually, as I always do, and usually hold the plastic-coated checklist in my hand as I read it, but I *deferred* one item of tantamount importance to a later time and relegated to my memory the task of prodding me to fulfill that last operation at a given moment.

A beautiful sunrise, a radio conversation, an emotional moment, any stray train of thought can block momentarily the memory until it is too late. I never defer an item now. If something does not check out, I stop right there and only continue on down the list when I'm satisfied that it does. A deferred check had better be an unimportant one, because it probably will be forgotten. When I get to the end of a checklist, I know, without reservation, that I am ready to go, and the only function my fickle memory has to perform is to relax and try to take in all the enjoyable scenery of the trip.

Now, where's that chart? END

Guide To Nav-Com

(Continued from page 50)

priced of the lot. King has realized the need for such equipment in the lower price brackets and has one under development at this time which is intended for mounting in the same package with the KX-100 or the KR-40 Nav receiver. With the exception of Motorola and ARC, all glide-path receivers are manufactured to ARINC (Airline) specifications and fit a ¼ ATR shock mount.

Marker beacon transmitting systems consist of a 75-mc transmitter and a complex directional antenna system radiating a vertical pattern whose cross section is elliptical or "dogboned" in shape. The two types of patterns can be seen on many sectional charts. The elliptical types, when on an airway, are four miles wide at 1,000 feet and 12 miles wide at 10,000 feet above the station. The "dogbone" pattern, which is only 2¾ miles across at the center, is used where needed to designate a holding point more accurately.

Markers serve a variety of purposes along the airways and in conjunction with landing aids. On the airways, where an off-airway omnirange radial or low-frequency range station leg is not available to define a fix, a marker may be installed. This will provide the pilot with a positive fix along the airway and perhaps serve notice to him that a new en route minimum altitude exists for the next segment of his trip. Many low-frequency range stations are equipped with "Z" markers to indicate "over the station" when the pilot may not have been able to pass through the cone of silence. Fan markers are an integral part of the instrument landing system. One, the outer marker, being located several miles from the airport and at a point where the glide path should be acquired and a second, the middle marker, at a point quite close to the airport and prior to which the pilot should not descend below a certain prescribed altitude. Airway markers are considerably more powerful than those used in conjunction with the ILS since they must also be used by aircraft at high altitudes.

The lower power of the ILS markers is adequate since the aircraft are quite low when using this type of facility. Airways markers are modulated by a 3,000-cycle tone keyed in a series of dots and dashes according to an established code which will be found on sectional and radio facility charts. "Z" markers transmit a continuous 3,000-cycle tone. The ILS markers use different tones than airways markers, the outer marker being modulated by a series of 400-cycle dashes and the middle marker by a series of alternate dots and dashes of a 1,300-cycle tone.

Marker beacon receivers are basically of three types—aural, one-light and three-light. Aural marker receivers are rarely ever seen outside a low-cost Nav-Com system, although Motorola is offering its NAVPAC 100 Omni-Loc unit with aural or one-light marker at purchaser's option. With the aural marker, the pilot will hear the characteristic modulation of the particular marker over which he is flying. In the single-light types, he will hear the signal and see a light on the instrument panel which will flash in step with the modulation signal. The three-light marker receiver has tone filters that operate relays to light the lights on the instrument panel, each filter being tuned to the modulation frequency of one type of marker. A pilot using a three-light marker will see a white flashing light over an airways marker, a steady white light over a low frequency range "Z" marker, a flashing blue light over the outer marker and an amber flashing light over the middle marker. Each light will blink in accordance with the modulation signal, which the pilot hears, so he has a double check on the operation of the marker receiver.

A number of signals, other than marker signals, can operate a marker receiver which is why the FAA requires an aural presentation in addition to the lights. It doesn't take much imagination to guess what might happen on an approach if a stray signal operated the marker receiver prior to the middle-marker site if the pilot was not monitoring the aural signal, especially if he was not using a glide-path receiver.

The sensitivity of marker receivers is purposely quite low as compared to VHF communication receivers although some are equipped with a High-Low sensitivity switch. The higher sensitivity is sometimes helpful when you are actually some distance from a very weak station by reason

(Continued on page 116)

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(Continued from page 115)

of high altitude. The switch should always be in Low position, however, during approach, or the ILS markers will appear to have abnormal width. The type of receiver circuity varies widely becoming more sophisticated in the higher priced equipment. The most simple is the type found in the Narco Omnigator. It is a single-stage RF amplifier tuned to 75 mc with the detected audio signal fed to the audio amplifying circuits of the VHF receiver. Some are conventional superheterodyne receivers where the signal is combined with a local oscillator signal, perhaps crystal controlled, to produce the IF or intermediate frequency. The latest types are completely transistorized even to the elimination of relays with power transistors used in their place for operating the panel lights.

Nearly every manufacturer of airborne radio equipment offers a marker receiver to round out its line of equipment. The few that do not, have plans to introduce them soon. One of the most popular is the little Narco MBT three-light unit complete in one package measuring 1¼ x 3¾ x 7½ inches. Cost is $230. The panel lights are mounted on front of the unit and the panel is reversible so that, turning it over, there is a choice of vertical or horizontal mounting, since it is engraved in one direction on one side and in the other direction on the other side. The receiver is completely transistorized and the lights are of the press-to-test type with dimmers attached. It weighs 18 ounces and is equipped with white, blue and amber lights. No high-voltage power supply is required but the audio is only strong enough for earphones unless it is wired into the audio circuits of the Nav receiver. With one of the lights burning, it draws only 0.2 amps at 13.7 volts, somewhat more at 28 volts.

Motorola's marker receivers are of three different types. As mentioned above, the NAVPAC 100 is offered with either aural or single-light markers. Motorola also markets a three-light marker receiver as a separate package, their model 5608, with the same basic mechanical design of the LNC 100 NAVCOM system with which it is intended for use. It is supplied with power supply for independent use or without if it is to be powered from other equipment. Price is $325 plus $18 for the panel light kit. It weighs two pounds and is TSO'd.

As with the glide-path receivers, marker-beacon receivers are usually chosen for use with the same manufacturer's Nav-Com equipment with the possible exception of the two low-cost units we have already mentioned. Also like the glide-path receivers, the market receivers are designed for a ¾ ATR shock mount with the exception of Motorola, Narco and ARC. Because marker receivers are not very complex the ¾ ATR box is much too large for the equipment but is the smallest ARINC package size. It is always amusing to open one of these and find that it is so void of equipment inside.

Some pilots find it hard to remember which light comes on for which marker. I found this to be true among many experienced executive pilots that have made many ILS approaches. ARC must have recognized this, for their panel containing the marker lights, has a little diagram of the localizer beam, such as seen on charts, screened on the front with the lights mounted in their appropriate location and also identified with appropriate nomenclature. ARC's marker receiver is completely transistorized and, like most others, requires some amplification of the audio signal to make them audible through a cabin speaker.

This three-part series aims at giving you a working knowledge of the radio equipment available for your use. Questions regarding any one manufacturer's equipment should be addressed to the respective sales department. END

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October 13-16—Fly-in for Taft Oildorado Days, Taft, Cal., sponsored by Taft Wing, Kern County Pilot's Assn., Kern County Airport #2. Contact: Barbara Cypher, P. O. Box 593, Taft, Cal.

October 14—First Annual Fly-in, in conjunction with State Mechanical Corn Picking Contest, Canistota, S. D. Contact: Dr. Stanley Weiland, Canistota Development Assn.

October 16—Fly-in and Annual Chicken Barbeque and Color Tour, Antrim County Airport, Bellaire, Mich. Contact: Dianne Ritt, Antrim County Airport, Box 371, Bellaire, Mich.

October 17-23—Annual Convention, Aircraft Owners and Pilots Association, Las Vegas, Nev. Expected, 400 private aircraft and 1,000 pilots. Various guided tours. For information: John Matheson, Alamo Airways, Las Vegas, Nev.

October 18-19-20—Indiana Turkey Run Aviation Conference. Turkey Run State Park, Marshall, Ind. Fly-ins land at park or Crawfordsville. Transportation furnished. Call Turkey Run Unicom. Contact: Richard Cunningham, Director, State Aeronautics Comm., 311 W. Washington St., Indianapolis 4, Ind.

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Fly Fishing

(Continued from page 47)

spotting sardines are not the mere whim of a flying fisherman. During the hours of bright sunlight the schools of herring, which are canned as sardines, stay too deep to be seen. As darkness approaches, they come nearer the surface.

Flying between 200 and 500 feet altitude, Lehtinen spots the dark patches which indicate fish and dips low for a circle inspection. Through the walkie-talkie he directs one of his two fishing boats to the scene.

Weather seldom is a hindrance. Because of his low flying operation it literally takes clouds hanging on the waves before the flying fisherman cancels a takeoff.

Whether Lehtinen started to be a flyer and then became a fisherman or whether fishing led to flying is not clear, even in his mind.

"Like most of us who grew up along the coast of Maine," he says, "fishing was part of my life. I started flying as a hobby in 1937 and it seemed a natural asset to combine the two."

It wasn't until after World War II, however, that Lehtinen was able to make use of his flying in the "rounding up" of the Maine herring. As an instructor in primary schools and later a ferry pilot he logged more than 10,000 hours. Returning to Maine, Lehtinen took a job as a charter pilot. Much of his flying was over water along the coast. During each flight he practiced the art of fish spotting.

Not for three years did he feel he had sufficient experience to determine whether or not a school of fish was desirable for catching. Only the flip and the roll of the fish as they slide through the water gives an indication of their size. Even at the relatively slow speed of a Cub the judgment and sighting must be swift and accurate.

Lehtinen uses no optical aids. He doesn't even wear the customary sun glasses since the tint would distort the "silvering" appearance, particularly when the school may be well below the surface of the water.

Averaging 400 hours a season of low altitude flying, Lehtinen has been involved in only one accident. And this was not while looking for fish.

During one of his spotting missions, he saw a boat of a competitive fisherman in trouble. With his walkie-talkie he learned that the crew was trying to reach its port office on the radio to ask for assistance but was unable to make contact. Lehtinen flew off to the dock area, intending to land and report the distressed boat.

As he approached the cove where the dock was located, he changed his plan and thought he could slow-fly past the office and yell for the person inside to turn on his radio. The first pass at water level brought the radio operator out onto the dock. Lehtinen, eager to complete his mission and return to spotting fish in the rapidly diminishing minutes of light, pulled up for a steep turn to make another pass.

He went into a high-speed stall and had insufficient altitude for recovery. The J-3 plunged into the water on its nose and pontoon tips. "If I had just been wearing a shoulder harness," he recalls, "I probably would still have my own teeth and would not have had two broken vertebrae."

In addition to the one airplane washed out in this accident, Lehtinen has worn out two other Cubs—the primary enemy is salt water which corrodes the airframe as well as rots the fabric—in his ten years of fishing for Maine sardines.

The airplane is not the only modern innovation in the search for the silver sardine. Some fishing crews use sonar and other sounding devices to locate schools. The Maine sardine industry, through its state-sponsored council, also has instituted a grading system at a laboratory in Bangor where each catch is scientifically graded to insure constant quality control.

"I guess," says Lehtinen, "that the next logical step will be the use of helicopters so we can hover over schools and determine more quickly whether or not the fish are of the quality we want to net. But for a veteran fixed-wing pilot like me, the change will be slow to come." END

Who Speaks For You?

(Continued from page 46)

Much as these men deserve to be introduced by name, we must hold this report to how the machinery works, year after year, regardless of personalities.

In addition to the groups in the Council, there is the Air Transport Assn. of America (ATA) for the scheduled airlines, and the Assn. of Local Transport Airlines (ALTA), powerful because they fly in nearly every state.

The Air Line Pilots Assn. (ALPA) with the American Federation of Labor behind it takes firm stands on such issues as the 60-year age limit for transport pilots. ALPA spends 75 per cent of its budget on safety.

The new Air Traffic Control Assn. (ATCA) is beginning to function vigorously in this field. The Flight Safety Foundation is heavily endowed.

Also there is the Airport Operators Council (AOC) and the American Assn. of Airport Executives (Triple-A,E) among others too many to describe in one short story.

For private flying, the Aircraft Owners & Pilots Assn. (AOPA), under the same management for 20-odd years, is outspoken in defense of flight freedom and always is playing St. George in its attacks on a dragon known as CAA, now FAA. AOPA has quit the General Aviation Council.

So much for the groups. Most are close enough to their members to know what they want or ought to want. Their elected officers and directors guide the staffs with loose enough rein to permit fast action.

Most of the work is done by informal team-up of Washington staff men who happen to be interested in whatever is up for action. Today, NASAO, NBAA, ATA, and NPA might be represented in a conference with FAA on a pending air-traffic rule.

Tomorrow, the same men and a dozen others may converge on a Senate hearing, reinforced by association presidents from across the country with statements neatly

mimeographed for the press of the nation.

More is happening than ever before. The urgent problems caused by aircraft speed and traffic density were piling up, before the Federal Aviation Agency was created with arbitrary power to act.

FAA is obliged by law to advise interested parties before putting new rules into effect. When the seasoned Washington reps are consulted in advance, they can advise to make the rules workable.

Some branches of FAA do this. Others, the associations complain, hit without warning. The first intimation comes in a draft release, in the fine print of the Federal Register, with scant time to canvass the members and reply.

NBAA likes to circulate the full text of the proposal. Members are urged to register their views both with FAA and the association. Some hesitate to write FAA, and let NBAA pass the word.

After comments are in, hearings may be held or FAA may put the rules into effect forthwith. The more time the civil air groups have in advance, the better they can help officials to make sense.

In the case of the reallocation of aviation radio frequencies, government experts spent thousands of man-hours on a plan, only to find that it did not fit the actual needs of general aviation as they could have been told in one short meeting.

In the case of a glide-path light for airports, something needlessly expensive might have been chosen. But the R&D people were smart enough to ask advice. A flying farmer and a State aviation official told them about a simple little box that will do the job.

If differences can not be reconciled among the working staffs, high-level conflicts follow. Aviation interests, nationwide, can make a home-town approach to any member of Congress, as is their right in a representative system.

Federal agencies may seek to please Congressmen, especially on key committees, by spending money in their districts.

Charges of pressure may be made on both sides in the heat of controversy, but this is the way business is done in Washington, while administrators come and go.

The Senate and House Interstate Commerce Committees, responsible for civil air legislation, and the Appropriations Committees, holders of the purse strings, take a keen interest in solving the airspace problem.

They have let the associations sound off in public hearings, along with the federal men in charge, just to get the facts on record. While Congress gave FAA broad powers to speed necessary changes, demand is growing to restore appeal rights to the Civil Aeronautics Board, for review on merit. Courts can review only on points of law.

After the reorganization in January, normally to be-expected no matter which party wins, it is felt that reasonably smooth procedures will develop between government and industry as in the past.

For pilots and plane owners, the point of this report is that an association is working for almost every branch and subbranch of aviation, and you can be both informed and heard through those you choose to support. END

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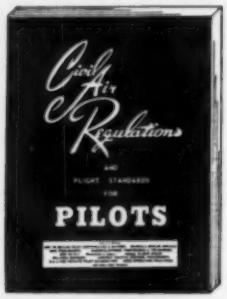

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Vecto Flight System

(Continued from page 41)

occur at this critical point, the horizon bar is retained in its exact position and the bank indicator is zeroed in at the top of the instrument. The aircraft should remain at or above V_2 speed and direction should stabilize. Power may be reduced to maximum continuous and the aircraft maneuvered for an engine-out approach to the airport. Of course, if no engine failure occurs, a normal or cruising climb would be established.

To set up cruise condition on the Vecto artificial horizon, the airplane is placed in straight and level flight and the reference marker placed directly over the horizon bar. Normal pitch corrections are made from this position as in regular instrument flight procedures.

The approach procedure is somewhat different. A best-approach attitude is selected and set on the upper fixed index. It normally will be at a "safe" airspeed somewhat above the minimum approach speed for the subject airplane. It would be, of course, in a gear-down, approach-flaps configuration. As the aircraft approaches the glide slope the reference is set to the approach index. On reaching the glide slope the nose is lowered to place the horizon bar beneath the reference and the appropriate power setting is established.

From this point on, the attitude is held constant; corrections to the glide slope are made by use of power. If the aircraft goes high on the glide slope, power is reduced, thus reducing the airspeed and increasing the rate of descent, a double correction which can be small. If the aircraft goes below the glide slope the power is increased, airspeed increases, vertical speed decreases, and the glide slope is reintercepted. Whether this system will work under extreme wind or runway conditions is unknown by the writer, but it seems possible for relatively high break-out airspeeds to exist.

FLYING's flight evaluation was flown from Newark Airport, N. J. and from Zahn's Airport, Amityville, L. I. Jim Cater was the demonstration pilot. He is chief pilot for Newark Air Service and demonstration pilot for Air Carrier Supply Corp., which is the New York distributor for Aero Design and Engineering Corp. Air Carrier owned the beautiful green-and-white Aero Commander 680E, N9368R, which was used for the flights.

Along with Hartwell, two other passengers and myself were on board, giving us a gross weight of about 7,300 lbs.

The ceiling was around 800 to 1,000 feet with the visibility between five and six miles in rain and fog. Control cleared us to fly at 2,000 feet in the vicinity of the Chatham homer for the purpose of the demonstration.

The Vecto instrument in the Commander was a vacuum model and it erected immediately as the engines were started. Some trouble was experienced with the computer portion as we taxied out and it broke as we reached takeoff position. It had just recently been installed in the Commander and the panel thickness caused a jamming of the setting mechanism.

As we did the 180-degree turn a rather large amount of pitch precession occurred with little or no bank precession being apparent. The horizon bar raised approximately three-eighths of an inch. It erected while taxiing back to the line.

The computer was quickly repaired and the second attempt at flight was successful. During the shut-down, however, the horizon had started spinning in the case and on restart was a considerable distance from level flight attitude. It took approximately four minutes for it to erect this time.

We were cleared to Runway 22 for our takeoff with no change in the weather. The usual pre-takeoff check was completed and the reference marker set to V_2 position. The Aero Commander accelerates very fast and the 100-mph V_2 speed was quickly reached.

The nose was raised, placing the horizon bar under the reference marker; we became airborne immediately. By the time the gear was raised and the left throttle was retarded we indicated 125 mph.

Jim Cater held the attitude exactly and directional control was good. I do not know whether he was using the directional gyro or not but the wings were level throughout, power was held at 40 inches mp and 3,200 rpm. The airspeed slowly backed down to 105 mph indicated and stabilized there with the vertical speed holding a healthy 500 fpm rate of climb. We crossed the field boundary at 500 feet above the ground and entered the clouds at about 1,000 feet.

Proceeding to Chatham it became apparent that demonstrations of the instrument would be ineffective and difficult under such conditions. We were cleared back to the localizer outer marker for Runway 22 at 2,000 feet. As we approached the outer marker we were indicating approximately 130 mph with gear and quarter-flaps. The reference marker was set to the approach position. Intercepting the glide slope, the nose was lowered to place the horizon bar beneath the reference marker and the power was reduced. The glide slope was held fairly well but the airspeed reached approximately 140 mph indicated at one time. We had no apparent trouble reducing the speed for the normal landing which followed.

When it became apparent the weather was to get worse instead of better, we postponed the balance of the demonstration until the following morning and arrangements were made to fly out of Zahn's Airport.

The next morning was cloudy and the ceiling was around 500 feet but within minutes after the scheduled time the little green-and-white Commander dropped out of the clouds over Zahn's and landed. Since the cloud tops were at 1,500 feet we anticipated no difficulties in completing the flight.

After taxiing the length of the runway and executing a sharp 180-degree turn for a northerly takeoff, the comparatively large pitch precession was noted again and the takeoff roll was started prior to any appreciable erection. The takeoff followed the preceding day's performance with the left engine again retarded at 125 mph indicated, but this time the speed gradually diminished to a bare 100 mph as the V_2 attitude on the Vecto horizon was held. With

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40 inches mp and 3,200 rpm the rate of climb stabilized on 600 fpm. The left engine was in the zero-thrust condition.

After climbing on top I took the left seat and Lane Hartwell demonstrated the various flight segments, such as descents, level-offs and go-arounds. In each case the aircraft responded as it was forecast. I took the controls and flew for a few minutes to become familiar with the plane—it is a real beauty and quite responsive. I found myself frequently flying on single engine as easily as though both were operating properly. The air was smooth as silk above the clouds and it was quite easy to hold exact attitudes on the Vecto horizon.

While on single engine a simulated approach was started. One-quarter flaps with 40 inches mp and 3,000 rpm resulted in approximately 135 mph indicated while in level flight. The reference marker was placed in the approach position, the gear was lowered, the horizon bar was placed under the reference marker and power reduced to 31 inches. The vertical speed moved down to indicate a 500 fpm descent while the airspeed hovered between 135 and 140.

As we approached the level-off altitude the reference marker was rotated to the level flight position and power was increased to 40 inches mp. As the horizon bar was placed under the reference marker, the vertical speed returned to zero. The reference marker was placed to the V_2 position and a go-around was executed with maximum continuous power, gear up and flaps up, as the airspeed dropped to approximately 105 mph and the vertical speed settled for nearly a 600 fpm climb.

The overall response of the airplane to the Vecto horizon attitudes during both flights came remarkably close to meeting the claims made for it. It is very legible in all positions. I had anticipated being troubled by the reverse indications of the bank index in such a blown-up presentation. I seldom look at it on a normal flight indicator, but it presented no problem. I found it actually did impress you that your wings weren't level when such was the case. Resetting the reference bar prior to each new major attitude change became a noticeable chore but, of course, we were going from one segment to another with no delay. In actual cross-country flying only a few changes would be made.

Making precise corrections in flight is aided by having the reference marker directly in line with the horizon bar. Minute movements can be detected where they would go unnoticed if such proximity was missing.

Vecto does not remove the need for the other flight instruments. The altimeter is still needed to tell how high you are, the vertical speed for its indications and the airspeed, directional gyro and turn-and-slip indicators for their very valuable information.

It is a good usable system of instrument flying. If it was used religiously, a very high degree of proficiency would be attained; certainly it simplifies engine-out procedures occurring directly after takeoff. Here, to me, it seems to be a definite, increased safety factor. END

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Training The Private Pilot

(Continued from page 60)

an easier to learn, "emergency type" system. The private pilot flight test may be passed utilizing either system.

Whichever system is taught the student, the concept of simultaneous training in both instrument and contact reference is a great advantage. You will be teaching the student to fly the aircraft, something which heretofore has not been done except "half way"—i.e., contact reference control only.

How did the new concept of simultaneous instrument-contact training emerge? How do we know that it does not involve more time and expense than the old "contact only" training in use since World War I? Why is it now virtually required by the new Civil Air Regulations Amendment 20-12?

The answer is that the new concept has been proven by a number of experimental operations, both civil and military. For lack of space, I will cite only the civilian operations in this article. For a more detailed and documented summary of prior research on this concept, the reader is referred to a staff memorandum by Oran B. Jolley of the Training Methods Division, Human Resources Research Office, George Washington University, dated June, 1958; and from which much of the following was abstracted.

As far back as 1934, T. Lee, manager of the then Boeing School of Aeronautics, conducted an experiment in which 16 students were taught to fly the aircraft solely by reference to flight instruments for 23 hours, and before they received any instruction utilizing contact clues. (See Lee, T. Jr., "Instrument Flying from Scratch." *Aviation*, Vol. 34, No. 12, Dec., 1935.) The results of this experimental program caused Mr. Lee to state: "We are now so completely sold that we believe all students taking instruction for long-time courses, such as our airline pilot course (250 hours) should begin their flight instruction under the hood . . ."

Very probably, the basis for Mr. Lee's statement involved a realization of three things, as a result of his experiment.

1. That control of the aircraft by sole reference to instruments was more "precise" and "fundamental" than control by means of contact clues.

2. That teaching control of the aircraft by sole reference to instruments *prior* to teaching control by contact clues gave the students a better and more "universally useful" grounding in aircraft control.

3. That by teaching instrument control prior to contact control, a greater "transfer of training" resulted than would have been possible if contact control were taught first.

The last conclusion, as to transfer of training effect, was confirmed experimentally some 20 years later in a controlled experiment conducted by Ritchie and Michael in 1953. (See Ritchie, M. L. and Michael, A. L., "Transfer between Instrument and Contact Flight Training," *Journal of Applied Psychology*, Vol. 39, No. 3, June, 1955.) The overall findings of this experiment were that when instrument control was taught *first*, a *positive transfer of 47 per cent* was carried over into contact control training. On the other hand, when contact control was taught first, a *negative transfer of minus 22%* was carried over into instrument control training!

Ritchie and Michael stated: "To the extent that the transfer results may be relied upon, it may be seen that the present procedure of having contact well learned before beginning instruments is at least wasteful of learning efforts. At the extreme it is possible that a whole generation of instrument-hating pilots was created when they met instruments which appeared unnatural, as they opposed well-established contact habits . . . !

The above cited experiments, while not necessarily conclusive, strongly indicated that, when both instrument and contact control were to be taught, that it was much more advantageous to teach instrument control prior to utilizing contact clues. If, therefore, we must teach one or the other "all at once," by all means teach instrument technique first.

I could not agree more. My personal view is that there are many advantages to grounding thoroughly the student in instrument techniques and principles prior to allowing him to become an habitually confirmed contact pilot only. Contact flight is a sort of privilege, usable and enjoyable only under favorable conditions, or for collision avoidance. In training the professional pilot, by far the heaviest emphasis should be upon the instrument part of his training. Strange as it may seem such emphasis will even "sharpen" his contact skills.

With the private pilot student, however, the situation is somewhat different. We must remember that he will probably not continue on to a professional level of skill. Also, what instrument flying skills he acquires during his training at best will be on the level of "emergency skills," usable and essential should he find himself caught on instruments.

If you will reread carefully the new CAR amendment 20-12, you will find that the above considerations have been thoroughly taken into account. The regulation emphasizes an emergency skill, and does not specify any "system." Either full or partial panel may be utilized in training and on the flight test. But note: the preamble to the regulation *definitely recommends that the instrument instruction given be integrated into the early part of the student's flight training.*

That recommendation was based on two other experiments, one conducted at the University of Illinois in 1955, and the other at the University of West Virginia in 1957. These two experiments sought specifically to apply previous findings as to sequence of instruction and transfer of training to the normal private pilot's course.

The broad question these two experiments were to answer was this: "Can we successfully incorporate in the present private pilot curriculum the necessary training in control of the aircraft by instrument reference, and without an increase in flying time and expense?

Space does not permit citing the detailed findings of these two experiments in this article. Both universities have published bulletins available for the asking which de-

tail the results. It is sufficient to say here that the answer to the question was a resounding YES.

How? By the simple expedient of teaching each air maneuver in the course in *both* hooded and "visual" flight. For example, teach the student first to do a 180-degree turn by sole reference to instruments—when he is proficient remove the hood and have him learn to do the same maneuver by visual reference.

It is simple and it works. Maneuvers learned on instruments are easily learned contact. I have observed check rides made in both experiments, and I know. Students who finish a private pilot's course under the new concept not only can do a good job "contact," but they also can put up the hood and do the same things on instruments!

Above all, these students realized they were not qualified for *intentional* instrument flight. On the other hand they were perfectly confident of being able to handle an unsought instrument flight emergency. What more can we ask?

We can ask this of all private pilots previously trained under the now antiquated "contact only" system. Consider well, going back and picking up the emergency instrument skills you may so urgently need some day, and which future private pilots will have gotten in the normal course of their flight training. END

The Birdcage Parasol

(Continued from page 51)

weight of plane and pilot was 235 pounds.

Alberto managed a number of short flights with this more efficient rig, one of which carried him over 200 yards, at 20 feet altitude; but, in landing, he broke his new wooden prop and, in a mood of exasperation tinged with facetiousness, he equipped the machine with a pair of oilcloth-covered paddles and mounted a fan between them to cool the engine.

Number 20 in the line of Santos-Dumont lightplanes was his crowning success. Powered by a 35-hp, water-cooled, Daraq two-cylinder opposed engine, its radiators tucked up neatly under the wings, it cruised on Sept. 13, 1909, from St. Cyr to Buc, five miles in 12 minutes, part of the distance at 180 feet altitude. The following day he flew back, whereupon he generously announced to the aviation world that from that day forth the plans of Demoiselle were common property. (This is the machine shown in the illustration.—ED.)

No great rush developed but a number were built during the next three years, largely because the entire affair could be made for under $1,000. It was a challenging little machine capable of doing a breathtaking 55 mph.

But no matter how one looked at it, the Demoiselle was definitely a peculiar looking creature. Its wing was set at an unusually high angle of incidence which produced excessive lift but only at the expense of great resistance. Most of this lift came kite fashion from the pressure of air against its under side. For this reason descents necessarily were made at a steep angle, using considerable power. Engine failure in mid-air produced the same effect on the machine as loss of the string on a kite and, unless the pilot could nose over immediately, he faced the prospect of descending to earth like a falling leaf. Although only two pilots are said to have succeeded in doing this, the Demoiselle apparently never killed anyone.

It was the position of the pilot that caused more amusement among the spectators at Belmont than any other feature of the plane. Sitting in his little canvas sling (in later models this risky perch was changed to a metal plow seat) suspended from the two longerons, he looked completely out of place, operating his five controls—one of which required the use of a special attachment on his jacket. Into a pocket sewed on its back, projected a rod which ran to the wing-warping wires. To bank, he simply leaned toward the side of his turn which he made with the second control—a vertical wheel operated by his left hand: forward, to go right; backward, to go left.

Up and down direction was accomplished by a second vertical wheel in the right hand: forward, down; backward, up. The throttle was operated by his right foot, and the spark control by a wire that dangled down before his face.

The Demoiselle was as delicate as a butterfly compared with its contemporaries, the big Wrights and Farmans and Curtiss pushers. But it flew and, in spite of the fact that its basic design was created in 1907, construction of Demoiselles continued into 1911—proof of its merit. END

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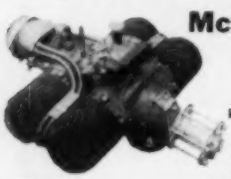
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Bay Aviation's Super-V

(Continued from page 55)

gyrations by test pilot Elton Stone left me lopsided, with instruments gone haywire, the ease of recovery was proof enough that the butterfly tail is well suited to two engines.

In low-speed flight at 90 mph, the airplane has positive control. There is no tendency to fall off, even in 30-degree banks. Minimum control speed of the light twin is 87 mph; on single engine, 105 mph.

In cruising configuration, at 75 per cent power (2,400 rpm and 24 inches mp), the Super-V indicated 182 mph and trued out to 206 mph. (Outside air temperature was 30 degrees C. at 5,000 feet.) At this power setting the two Lycomings delivered a total of 245 hp, which gives five-and-a-half hours endurance and a range of 1,200 miles.

At 65 per cent power (2,300 rpm and 23 inches mp), true air speed figured at 195 mph. Total power was 221 hp, endurance 6.7 hours, range 1,306 miles.

At 55 per cent power (2,200 rpm and 22 inches mp), the true air speed was 184 mph, endurance 7.7 hours, range 1,416 miles.

The airplane stalls at 67 mph "clean" and 73 mph, indicated, with gear and flaps extended. Docility is evident; there is nothing vicious about the airplane. It also has a good "critical" range, being yellow-lined at 190 mph indicated and red-lined at 240 mph.

As the speed dissipated, the Super-V crossed the boundary at 75 mph and came to a full stop within 550 feet. Normal pattern speeds run to 100 mph, on both downwind and base legs, with the final approach at 90 mph.

A comprehensive check flight is supposed to prove or disprove the folder facts. In the case of the Super-V it proved them with a bounty left over. The big test is still on the horizon, as the light-twin market is highly competitive.

If a simple look at a project can tell the tale, the Super-V stacks up well. Pitting it in the air against other comparable twins in the $30,000 class, the airplane makes a good showing. It flies fast for the money, and is reliable. And though a conversion, sports a pair of brand new engines, not remanufactured or overhauled.

On the other side of the ledger, there is a question as to how the resale value of the Super-V will hold up. But an owner-pilot who has his Bonanza converted will probably keep the twin long enough not to have to worry.

Super-V Specifications

Specifications and Performance:	
Empty weight	1,900 lb.
Useful load	1,500 lb.
Maximum gross weight	3,400 lb.
Power loading	10 lb./hp.
Wing loading	19 lb./sq. ft.
Fuel capacity (600 lb.)	100 gal.
Baggage area (300 lb. capacity)	34 cu. ft.
Maximum speed	210 mph
Cruise, 65% power	196 mph
Range, 65% power	1,300 st. mi.
Rate of climb	1,550 fpm.
Service ceiling	23,000 ft.
Absolute ceiling	27,000 ft.
Stall speed (gear, flaps extended)	67 mph
Landing distance (zero wind, 30 deg. flaps)	600 ft.
Takeoff distance (zero wind, 10 deg. flaps)	750 ft.

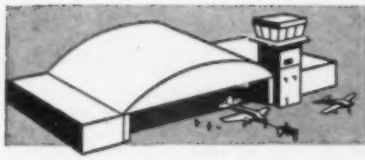
Powerplants: Two Lycoming O-360, fuel injection, derated to 170 hp at 2,700 rpm.

Optional Super-V accessories include: new interior $750; soundproofing, $295; new windows and windshield, $750; new exterior paint (two color), $1,085; aileron trim control, $150; Cagle brake units, $45; hyper wing tips (including antennae), $295; air conditioner, $485; external power receptacle, $95; propeller unfeathering accumulators $295. Varied radio packages run from $2,765 to $13,583.

Regional distributors for the Super-V have been appointed in Madison, Wisc.; Buffalo, N. Y.; Charlotte, N. C.; Hope, Ark.; and Toronto, Canada.

OPERATING COST—SUPER-V

	300 hrs.	500 hrs.
FUEL (15 gph @ $.35, tax subtracted) & OIL (1.3 qph @ $.50/gal) = $5.70/hr.	$1,710.00	$2,850.00
PERIODIC 100-HR. INSPECTIONS, ROUTINE MAINTENANCE & PARTS = $4.62/hr.	$1,386.00	$2,310.00
RESERVE FOR ENGINE & ACCESSORY OVERHAUL AT 875 HOURS = $3.75/hr.	$1,125.00	$1,875.00
MISCELLANEOUS (subscriptions, dues, charts, landing & parking fees, taxi and limousine, telephone, etc.)=$1.72/hr.	$ 516.00	$ 860.00
TOTAL VARIABLE COSTS	$4,737.00	$7,895.00
DEPRECIATION ($25,000/16 per cent per year)	$1,562.50	$1,562.50
INSURANCE (hull, legal & admitted liability, medical, etc.)	$1,632.00	$1,632.00
HANGAR RENT ($60/month)	$ 720.00	$ 720.00
MISCELLANEOUS (reserve for unscheduled engine repair, aircraft damage not covered by insurance, manuals, etc.)	$ 361.00	$ 361.00
TOTAL FIXED COSTS	$4,275.50	$4,275.50
ANNUAL UTILIZATION—		
PER AIRCRAFT HOUR	$ 30.04	$ 20.28
PER AIRCRAFT MILE	$ .15	$ .10
PER SEAT MILE (4 persons)	$ .03	$ .025
(2 persons)	$ .075	$ .05



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BONANZAS: 26 from $6670. 1952, C-35, QXGF/BF, has 150 hour 225HP remanufactured engine. Auto-pitch control metal propeller. Auxiliary tank. Pitot heat. Gyros. L-2 three-axis auto-pilot. 2 VHF transceivers. Omnirange. ADF-12. Repainted, reupholstered 1959. Hangared. Undamaged. Extras. Beautiful. Bargain. $12,000. Powers & George, 475 Fifth Avenue, New York 17, N. Y. "Exporting."

TWIN Bonanzas: 15 from $39,500. 1956, D-50, #FGSF/DF, has 200 hour 295HP engines. 6 place. Auxiliary tanks. Complete L-2 auto-pilot. Excellent ARC and Lear radio. Oxygen. Many extras. Hangared. Undamaged. Relicensed July. Cost $101,560. Asking $57,500. Powers & George, 475 Fifth Avenue, New York 17, N. Y. "Exporting."

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ALL Models: 1947, 150HP Cruisair, "JFFFQ/F, has 85 hours SMOH. Fiberglass fuselage. Small fins. Outside baggage door. Electric gear. Aeromatic. Primary blind. Omnigator. Repainted 1960. Relicensed June. Beautiful. $4950. Powers & George, 475 Fifth Avenue, New York 17, N. Y. "Exporting."

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172 EX-170A: 170A, #TQRP/AF, has Met-co-air tricycle gear conversion to 172. 173 hours SMOH. Primary blind. LF. VHF. Omnirange. Hangared. Undamaged. A bargain 172. $4750. Powers & George, 475 Fifth Avenue, New York 17, N. Y. "Exporting."

172's: 12 from $6600. 1956, PSFZ/AF, has 330 hours SMOH. Skylane paint job 1960. New interior. Rotating beacon. Gyros. LF. LTRA-6 VHF omnirange. ADF. Undamaged. Hangared. Exceptional. $7150. Powers & George, 475 Fifth Avenue, New York 17, N. Y. "Exporting."

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MARK 20's, 20A's: 12 from $7600. June 1958, Mark 20A, #PRPT/BF, has 240 hours. Gyros. Mark 2 Omnigator. ADF-12E. Extras. Hangared. Undamaged. Excellent. $10,900. Powers & George, 475 Fifth Avenue, New York 17, N. Y. "Exporting."

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ANSWERS to Jeppesen Quiz on page 97. 1. Bluff on high ground. 2. Approach light pattern. 3. Water tower and height. 4. Running under construction. 5. Power line. 6. Large building and height.

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Briefings . . .

(Continued from page 12)

out with Airwork Corp., authorized overhaul shop for Rolls-Royce engines, covers both normally scheduled and emergency engine changes after January 1, 1961. Rolls-Royce is currently protecting Gulfstream owners against premature removals with an engine pool, but this program ends December 31, 1960.

MELVIN N. GOUGH, recent director of the National Aeronautics and Space Administration's (NASA) Atlantic Missile Range operations office, Patrick AFB, Fla., is new director of CAB's Bureau of Safety. An experimental engineer-test pilot and former chief of flight research at Langley Field, Va., Mr. Gough succeeds Oscar Bakke, now director of FAA's Bureau of Flight Standards.

AIR CARRIER SUPPLY CORP., authorized distributors of Aero Commander airplanes for New York, New Jersey and eastern Pennsylvania, are established in permanent operating headquarters at Newark Airport. Company's executive offices are at 230 Park Ave., New York City.

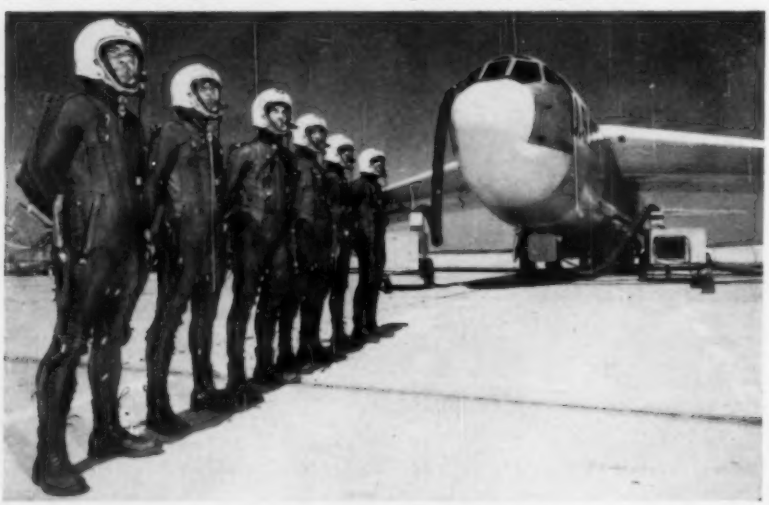
SEVEN U.S. CITIZENS, recently found guilty of violating FAA's new regulation against imbibing alcoholic beverages from private supply aboard a commercial airliner, have produced a total of $1,400 in civil penalties to the agency. Each offending passenger could have been fined $1,000, according to the regulation. The incident involved seven Americans and one Canadian on a New York to Montreal flight. No liquor was carried or served by the airline on this flight.

IN TULSA, OKLA., Ross Aviation has formed an aircraft leasing company (Ross Leasing Co.) with Joe F. Cannon, executive v.p. of the parent company, appointed president of the new operation. A quarter-million dollar contract to Ross Aviation also has been announced by its president, Joseph Ross, for continuation of instrument flight training of pilots at Fort Sill, Okla., U.S. Army Artillery and Missile Center.

AT WESTCHESTER COUNTY AIRPORT in suburban New York, Pacific Airmotive and its wholly owned PacAero Engineering Corp., has opened an eastern sales office under the direction of A. L. Franks. One of the three distributors for the Grumman Gulfstream executive turboprop transport, as well as manufacturers of the Learstar executive transport, improvement kits for Twin Beech, Lodestar, DC-3 and other aircraft, the company's main plants are in Burbank and Santa Monica, Cal.

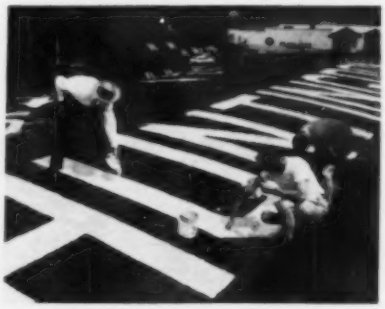
THIRD REVISED EDITION of Charles A. Zweng's manual "Control Tower and Dispatcher Ratings" has been published by Pan-American Navigation Service, North Hollywood, Cal. A complete guide to both FAA ratings, with text and latest typical written examinations, this manual is designed especially to prepare candidates for FAA's Aircraft Dispatcher and/or Control Tower Operator certificates. Price is $5.

A PRACTICE NAVIGATION computer—50 cents in price—may be purchased from the Plumly Manufacturing Co., 705 Dan Waggoner Bldg., Ft. Worth, Tex. Useful for all aircraft, the new practice computer, eight inches in diameter and of sturdy material, reproduces all the readings featured on the Plumy professional models. Its price includes a complete instruction manual and a $2 certificate toward purchase of the firm's all-metal pocket-size professional computers.



LIKE FIGURES IN A science-fiction movie scene, these men of a B-52G experimental flight crew, decked out in MC-3 pressure suits, stands ready to board the missile bomber in background for a high altitude test mission. However, prolonged missions in SAC's B-52s can be made without these suits at 40,000 feet. The MC-3 pressure suits are designed for flights above 50,000 feet.

THE SEASON is still on for touching up the old and installing new "signposts of the air," a national activity now of many years standing. The State of Pennsylvania, one of the pioneers in air marking, has more than a thousand markers installed, and more planned. Many in the state are floodlighted: all are reflectorized with millions



of tiny glass spheres for maximum visibility even in bad weather. With a new paint developed by Prismo Safety Corp. of Huntingdon, Pa., the markers are good for seven years. Here Thomas Stark (left) of the Aeronautics Commission spreads reflective glass spheres as Robert Herr and Robert Enders, his co-workers, spread on the paint

E. CLINTON TOWL (right), administrative vice-president of Grumman Aircraft Engineering Co., and one of the founders of the Long Island firm, has been named president to fill the vacancy left by the late Leon A. (Jake) Swirlbul. William T. Schwendler, also a founder member and senior vice-president, has been appointed chairman of the executive committee. Leroy R. Grumman continues his post as chairman of the board.

RECENT SAFE PASSAGE through Congress of bill H.R. 11787 has assured continuation for another four years of the ROTC Flight Instruction Program.

ON OR ABOUT OCTOBER 16, Chuck Banfe, Pan Am captain, takes off for an around-the-world flight in a Super V, Bay Aviation Services' twin-engine conversion of the Beech Bonanza. (See check pilot report, elsewhere in this issue, for details on the Super V.) Sponsored by Bay Aviation Services and the State of Hawaii, Banfe's route is Honolulu, San Francisco, New York, London, Rome, Beirut, Karachi, Bangkok, Singapore, Manila, Tokyo, thence back to Honolulu via Wake Island.

FIFTEEN THOUSAND singing Japanese passengers—all female—made a recent trans-Pacific crossing from Tokyo to the U.S.A. aboard a single Pan Am DC-7F, an all-cargo aircraft. The manifest listed 15,000 canaries for delivery in Los Angeles, San Francisco, Chicago and New York. The airline reported "all passengers arrived in fine voice."

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